FOUNDRY
EST. 1902 TRADE JOURNAL
VOL. 98 No. 2015 WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL APRIL 14, 1955
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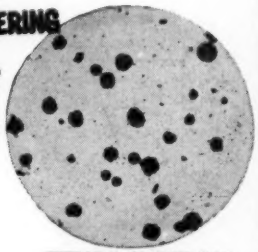

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Established 1902

Vol. 98 Thursday, April 14, 1955 No. 2015

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AN INDUSTRIAL NEWSPAPERS PUBLICATION

Published Weekly
Single copy 9d.; by post 11d.;
Andual subscription: home 40s., abroad 45s. (prepaid)

JOHN ADAM HOUSE, ADELPHI, LONDON, W.C.2
'Phone: TRAfalgar 6171 (10 lines)
'Grams: Zacatecas, Rand, London.

Boundaries of the Foundry Industry

It is surprising how very few foundrymen have a complete insight into the ramifications of their own industry. They are cognizant of the main divisions—iron, steel, and non-ferrous—and are aware of the main sub-divisions, malleable, brass, bronze, aluminium, and magnesium, to include die-castings. Yet there are many other branches of foundry practice which are very important but less well known. One quite interesting branch is the manufacture of magnets, a proportion of which are made as castings. It is a very active business, undertaking a good deal of valuable co-operative research. Another section, also not well known, is the making of lead castings. In this country some very large vats are cast for the chemical industry, but in Spain, for example, there seems to be quite a number of foundries which specialize in the making of gargoyles for churches. Text-books on foundry practice often refer to slush-castings. This is a process we have never seen, but it is one which is used for the making of toy-soldiers and the like. Just after the last war we had several enquiries as to what firms made the necessary dies, and if our memory serves correctly we identified three such concerns, so this process must service quite a sizeable business.

Recently, a new section of the foundry industry has come into being and is extending rapidly, that is the making of "costume jewellery." One foundry equipment company is specializing in the provision and servicing of suitable plant for this purpose. This business enters into the field of precision casting, a process which is also used by the dental profession in connection with the stopping of teeth. Moreover, there is the casting of dentures in stainless steel.

Though not regarded as founders, the printing industry probably turns out a larger number of castings every day than the whole of the foundry industry. By a slight misnomer, it is the suppliers of the metal who are known as "type founders." However, if it be accepted—which it will not—that a founder produces castings then neither a type founder, nor a maker of brass billets should carry that appellation. A factory looking very much like a foundry (for therein is a cupola and ancillary plant) is a plant making chilled-iron abrasives. It has, we believe, been legally established that these "bits and pieces" are not castings, because they have not been poured into a mould which governs the final shape. This last statement shows clearly that sand is not an essential prerequisite, as metal moulds or dies are included. It still leaves ingots and cast billets "in the air" for a more precise definition, as these are obviously not castings in the generally accepted meaning of the word.

Notes from the Branches

Bristol and West of England

The Bristol and West of England branch of the Institute of British Foundrymen held a very successful meeting at Exeter on March 19, in conjunction with the Devon and Exeter Productivity Council, when Mr. S. Taylor presented a talk on "The Production of Heavy Steel Castings," the talk being illustrated by slides and a film. An attendance of 58 members and friends was amply rewarded by an interesting paper dealing with castings well in excess of the size of those ever produced in the West Country, and members were surprised at the quantities of materials used and the number of man/hours required in the production of such castings. Many questions were naturally aroused by so interesting a paper, and in his replies Mr. Taylor made the following points:—Cast-iron grids for the heavy cores were eminently suitable for this type of work, since as well as being able to withstand great amounts of strain, they can be easily broken for core removal. In the case of very large castings, crack detection is employed over the whole casting, Gamma-ray inspection can only be used on smaller castings. The use of exothermic sleeves is essential with large castings of high chromium content in order to avoid segregation. Best results were being obtained by alternate use of "arc feeding" and exothermic sleeves, which ensured better fluidity of metal in the feeder heads.

Owing to the large quantities of metal used in the bigger castings, it was essential to pour castings direct, and not wait for the runner bush to fill up. The stripping qualities of all castings were good, except possibly on any sharp radii.

MR. TAYLOR, in replying to one member, stated that when the production of larger-than-average castings was under consideration a full-scale rehearsal of all operations was made with a view to ascertaining correct clearances for cranes, ladles, ladle capacities and pouring times. For the smaller type of castings, Mr. Taylor agreed that American practice, namely the use of sand moulds as opposed to the "compo" mixture used for the largest castings, gave satisfactory results.

In proposing a vote of thanks to Mr. Taylor for the lecture which he was certain all present had enjoyed, MR. H. E. HOLLADAY said that English Steel Corporation, Limited, the producers of the castings which had been the subject of the lecture, had every reason to feel proud of their achievements. All British foundrymen could derive a sense of pride in the fact that these castings had been produced in British foundries in the face of international competition.

MR. D. A. RICHARDS seconded the vote of thanks, in reply to which MR. TAYLOR reminded the audience that castings of the size which had figured in the lecture could only be produced as a result of teamwork on the part of all concerned.

British Patent No. 662377

F. W. Berk & Company, Limited, have drawn attention to the item appearing in our issue of February 24, 1955, concerning British Patent No. 662377 entitled "Exothermically Reacting Mixtures." Acting on behalf of the owners of the Patent, they have asked us to announce that full rights under the Patent for the United Kingdom are vested in themselves in collaboration with *Doittau Produits Metallurgie of Corbeil*, France, who hold exclusive rights for the whole of Europe.

Correspondence

AN EASY JOB

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—The comments made by Mr. Ian Garvie, at the annual dinner of the West of Scotland Association of Foremen Engineers, *vide* your issue of March 24, suggesting that National Service men turned to selling as an "easy job" can only have been made from sheer ignorance, or from an unthinking desire to score a cheap point.

The technique of modern salesmanship demands the expression of mental and physical qualities, far more varied and vital than in occupations governed by formulæ and slide-rules. Anyone with an experience of selling "on the road" knows it is complete nonsense to aver that convincing buyers of all types is an "easy job." Knowledge of the product, heavy responsibilities, psychological understanding, physical fitness, an alert, balanced mind and dogged pertinacity are only a few essential qualities needed.

Not all ex-Service men have a taste or flair for engineering. Those who have will naturally turn to that specialized skilled crafts, and to them it would probably be an "easy job."—Yours, etc.,

T. W. HANCOX.

United Commercial Travellers' Association
(U.C.T.A.) of Great Britain and Ireland,
180/182a, Tottenham Court Road, W.1.
March 29, 1955.

International Foundry Congress June 19 to 25, 1955

Due to limitation of accommodation, it may be necessary to restrict the numbers of members attending certain of the functions included in the International Foundry Congress programme. Should this position arise, applications will be considered in order of receipt. Accordingly, it is pointed out that, in their own interest, members of the Institute of British Foundrymen should complete their application forms and forward them to the secretary of the Institute at St. John Street Chambers. Deansgate, Manchester, 3, at the earliest possible date.

Questions have arisen concerning the use of the terms "delegates" and "members" in the Congress programme. It is pointed out, therefore, that the term "delegates" applies to all attending the Congress whether from at home or abroad, whilst "members" applies specifically to members of the Institute. It should be noted also that when the term "Official Delegate" is used, it applies only to the two specially-appointed representatives of each association represented on the International Committee.

Council of Ironfoundry Associations

At the annual general meeting of the Council of Ironfoundry Associations held last month, Mr. N. P. Newman, J.P., was re-elected chairman, as were the three vice-chairmen, Mr. P. Leonard Gould, O.B.E., Mr. F. D. Ley, and Mr. H. V. Shelton. The membership of the Executive and Finance Committee now consists of Mr. D. Graham Bisset, Mr. M. J. Glenny, Dr. J. E. Hurst, C.B.E., Mr. A. E. Peace, Mr. A. Watson, Mr. A. Aston, and Mr. V. Jobson.

Melt-quality Tests—I Non-ferrous

Symposium Organized by the London Branch of the Institute of British Foundrymen

A meeting of the London Branch of the Institute of British Foundrymen was held in the Waldorf Hotel in January. The branch president, Mr. W. Wilson, presided during the early part of the meeting and, inasmuch as he had to leave fairly early, he invited the senior vice-president, Mr. F. Hudson, F.I.M., to occupy the chair.

The subject of the meeting was a symposium on "Melt-quality Tests"—I Non-ferrous. It was introduced by three speakers—Dr. V. Kondic, of Birmingham University, dealt with the academic aspects of the subject; Mr. J. Wood, representing the Light Metal Founders' Association, discussed the light-alloy aspect; and Mr. A. French, representing the Association of Bronze and Brass Founders, covered copper-base metal experiences and needs.* There were also present at the meeting representatives of the Institute's technical subcommittees, members of the ABBF, the LMFA, and the British Bronze and Brass Ingot Manufacturers' Association technical committee.

THE CHAIRMAN (Mr. Hudson) then introduced each of the opening speakers.

Academic Aspects

By Dr. V. Kondic

DR. KONDIC said that his main task was that of introducing the subject under the discussion. He thought that a good way of doing that was, first, to define the term "melt-quality test," and secondly, on a specific example to analyse the use and interpretation of melt-quality test results.

"Melt-quality test" could be defined in two different ways: One could define a melt-quality test as a test that was given to a laboratory boy to keep him out of mischief and to keep him on the foundry floor ostensibly to exercise a psychological influence on the rest of the people working there.

The second definition of a "melt-quality test" assumes also a test carried out on the foundry floor, but results of which are carefully examined and assessed with a view to carrying out certain rectifications immediately or at some later date. It was on that definition that he based his subsequent remarks, but he was aware that the former test has its proper place in certain cases.

According to this second definition the test could be the result of empirical work or scientific investigation, it could be qualitative or quantitative, but the essential point is that the meaning of the test must be completely clear and the results capable of unambiguous interpretation.

In this respect fluidity as a melt-quality test offers a unique example to illustrate the difficulties that are encountered in the development of a melt-quality test.

Fluidity

Fluidity as a property is one of the greatest foundry puzzles. It is talked about, discussed, investigated—and yet there was no fluidity test that foundries in general could make use of. The well-known spiral test is used to such a limited extent that it must be obviously considered as a failure as far as melt-quality test is concerned.

Having studied the literature on the subject, talked to foundrymen and carried out experiments himself, he had concluded that there were two or three reasons why the spiral fluidity test had failed. First it had departed from the definition—"Fluidity is normally defined as that property of metals which measures its ability to fill the mould, particularly that including thin or detailed sections." But the test which was developed and which is known as the spiral fluidity test gives the length of metal in a spiral mould, the section of which is designed to meet the circumstances. But was that really a measure of fluidity? In his view, the correlation between the spiral length and the fluidity as defined above, has never been established. Secondly, if any test were to succeed, it should be reproducible, easily carried out, and should give results which could be interpreted by the foundryman in a clear-cut way. But if one tried to carry out the spiral fluidity test, one could make the length longer or shorter, depending on how the metal was poured, how the mould was made, and so on. If a test were subject to so many variable effects it was no wonder that foundrymen by and large had rejected it as a regular test on the foundry floor.

Another reason why the spiral fluidity test had practically lost its value was that the spiral length had been found to be subject to two main variables; one being the temperature and the other the metal quality and composition. The temperature effect is well known. If one wishes to be sure to fill a mould, including the thinner sections, one had only to heat the metal to a sufficiently high temperature and pour it. Why, then, use a fluidity test? Why not use a thermocouple which was just as good and a more reliable method of measuring the temperature. If a fluidity test were going to give a measure of temperature only, what was the use of it, unless it be the economic one to save on the costs of thermocouples.

Let us now assume that the test should be a melt-quality test. What was meant by "melt quality"? It did not mean only the alloy composition. What he had also in mind were those curious effects which were normally attributed to gases, impurities and similar causes. Taking grey iron as an example of the sort of thing that occurred, he said, any grey iron founders would say that sometimes, quite suddenly and for no apparent reason—although there

* This part was published in the JOURNAL March 10 and 17, 1955.

was no change in carbon or silicon content—the iron just would not flow as well as expected. If the trouble were not connected with temperature or with carbon or silicon content, then it must have something to do with the "metal quality." A foundryman would say, for example, that the iron was oxidized, but the scientist would say that he is still not quite clear about the term oxidized iron. There must therefore be something mysterious about a case where foundrymen and scientists cannot help each other.

Those were the three main reasons why the spiral fluidity test failed: it did not follow the definition, it was a test not readily reproduced on the foundry

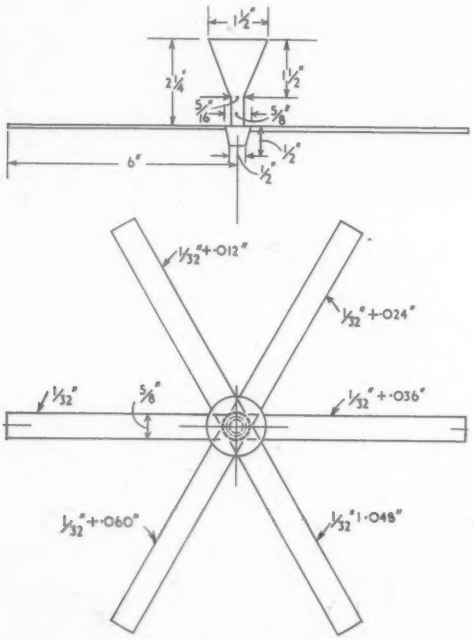


FIG. 1.—*Star-shaped fluidity test-piece.*
Description: Six arms of equal width (⅛ in.) and increasing sectional thickness, as indicated are poured, keeping the central runner full. The actual thickness dimensions and other measurements can be varied to obtain best results with a particular alloy.

floor, and it failed to detect metal quality. Scientists and foundrymen ought to be able to provide a better solution for fluidity testing than the spiral test.

If one now approaches the subject of fluidity testing afresh, then the first requirement should be that the test agrees with the fluidity definition, seeing that it is related to the variable mould cross-section.

Secondly, it should not be sensitive to the normal variables encountered in the foundry, in connection with moulding sands, pouring method, and so on. The conditions of the test should be such that moulds made by different people and poured by different people should give the result within the experimental error of what is measured.

The third requirement was not easy to resolve. What could one do about a test which was subject to two major variables, namely, temperature and metal quality? Fluidity was certainly affected by temperature, but one wanted also to assess fluidity, at a given temperature, as a measure of metal quality. It is, therefore, essential to decide in advance whether the fluidity test was to be used for temperature or for metal-quality testing.

"Star" Test

Dr. Kondic then exhibited some star-shaped specimens (Fig. 1) produced by a fluidity test on which he and his colleagues had been recently working. So far the results show that the test was sensitive to ±10 deg. C., which should be reasonable in many cases on the foundry floor. He showed then two specimens made in cast iron where the only difference was a reduction of carbon con-

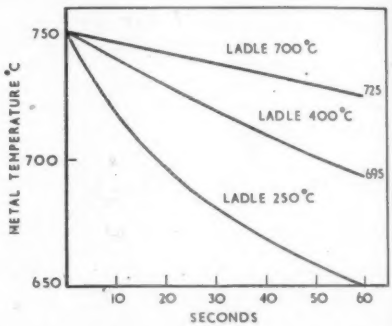


FIG. 2.—*Cooling curves for an aluminium alloy contained in a 6-in. hand ladle.*

tent by about ± 0.15 per cent.; the tests showed the effect of the difference in fluidity. Again, it was very easy to get an estimate of the carbon equivalent from the test; this effect could be seen on examining the fracture in the castings produced.

Whilst he did not contend that he and his colleagues had arrived at the final answer to the problem of fluidity testing, he did consider it worth while to attend a meeting of foundrymen and to bring forward arguments concerning the principles of melt-quality testing and what melt-quality test should do. The final and crucial answer upon the value of the suggested test, will be obtained only on the foundry floor.

Finally, he said that, as well as star-shaped tests, they had tried wedge sections. He exhibited two samples made from the same grey iron, the only difference being a difference of 20 deg. in pouring temperature, and commented that the results were quite promising for grey iron.

MR. WOOD and MR. FRENCH then read their respective contributions in that order.

Melt-quality Tests for Light Alloys

*by J. Wood**

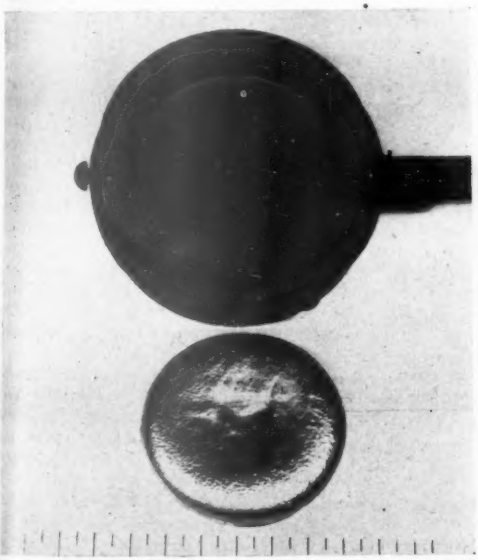
In attempting to devise melt-quality tests for light alloys, it is obviously necessary to define the defects which are likely to occur as a result of poor melting practice. In order to limit the field to be covered, this Paper will be confined to aluminium-base alloys, although very similar conditions will hold for magnesium-base alloys. In aluminium-alloy castings, the major defects resulting from poor melting practice are (1) gas porosity; (2) non-metallic inclusions (generally oxide), and (3) coarse grain-size. Special tests are necessary for certain alloys, *e.g.*, the control of modification in the aluminium/12 per cent. silicon alloys and metal/mould reaction in the aluminium/magnesium alloys, but such tests do not come within the scope of those discussed here.

Before considering the three factors of gas content, oxide content and grain size, in more detail, the importance of accurate temperature measurement and control should be emphasized. In many foundries, temperature control in melting and holding furnaces receives little attention, and even in cases where these temperatures are measured, the actual pouring temperature from the crucible or ladle is seldom known. The actual pouring temperature of the casting may be 50 deg. C. lower than the temperature in the furnace, and as test castings may be poured with different ladles, or smaller quantities of metal than production castings, the control of actual pouring temperature must be exercised otherwise the melt-quality test does not give a reliable result. In Fig. 2, cooling curves for aluminium alloy in a 6-in. dia. hand ladle are shown, illustrating the effect of ladle temperature on the rate of cooling. With a cold ladle, the temperature drop in 10 sec. is about 30 deg. C., but with well preheated ladles, the fall in temperature does not exceed 50 deg. C.

If any test is to be of value, it must satisfy certain criteria, the test must be (*a*) simple and easy to operate (*b*) give results quickly (*c*) be accurate, and (*d*) inexpensive.

* International Alloys Limited.

FIG. 3.—*Graphite mould and a cast sample produced from it, as used on the Continent for estimating the quantity of gas present.*



Gas Content

As practically the only constituent of the gas dissolved in liquid aluminium is hydrogen, it is generally understood that the term gas content means hydrogen content. In most cases, the gas content of a melt is required to be low, particularly when sand castings and high-duty gravity-die-castings are to be produced, and special treatments for the removal of gas are usually carried out in foundries. For many gravity-die-castings, however, deliberate additions of gas are often made in order to prevent cavities and cracks resulting from solidification shrinkage.

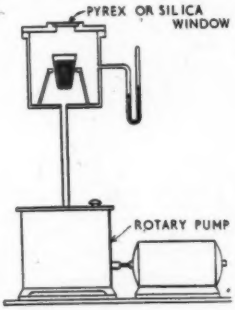


FIG. 4.—*Straube-Pfeiffer apparatus for vacuum-solidification testing.*

The methods suggested for the assessment of gas content of a melt which seem to be of practical interest are:—(1) Direct measurement of hydrogen content;[1] (2) the vacuum solidification test; (3) a graphite-mould ingot; (4) density determination of a cast sample; (5) microscopic examination of a cast sample, and (6) radiographic examination of the casting.

It is not possible to use a fracture test as used in the copper-base alloy industry for the estimation of gas content, as there is no colour change in aluminium alloys between sound and porous castings.

It is practically impossible for any one test to satisfy all the conditions stipulated above, and therefore some compromise has to be reached to find an acceptable test. The direct measurement of hydrogen content, as suggested by Ransley, is the only test which measures the true gas content of the liquid melt. Although the equipment may be

FIG. 5.—*Method employed in the Author's works for conducting the vacuum-solidification test.*

rather delicate for foundry use, the operation seems easy to carry out, and is the most accurate method available. The time required for the test is in the order of 15 to 20 min., which is too long for useful application of the method. The cost is relatively high, and as there is yet no practical experience with the method, it cannot be considered as a routine test at present.

Vacuum Solidification

The vacuum-solidification test is relatively simple in operation, as it merely involves casting a sample into a crucible, which is placed in a vacuum vessel and allowed to solidify under reduced pressure. The time required for solidification of the test sample is about 2 min. only, but the cost of the equipment is in the order of £50 to £100, as a vacuum pump is an essential part. The test has high sensitivity as the sample is solidified under a pressure of 20 to 50 mm., thus magnifying the gas cavities to 40 to 15 times their size under atmospheric pressure.

The observation of the surface of a sample solidifying in a preheated graphite mould is used on the Continent as a gas test. It has the merits of low cost, ease and speed of operation, but the sensitivity is low, compared with the two tests discussed above. It will distinguish between high and low gas-contents, but it is difficult to detect slight but significant differences. The graphite mould and a cast sample produced from this mould are shown in Fig. 3.

Density determination of a sample cast under standardized conditions has the merits of ease of production of the sample, and accuracy, and is in fact widely used as a laboratory method for the estimation of percentage voids. If a melt be saturated with gas, it will give a casting with about 2 per cent. voids, therefore, to obtain reasonable accuracy in assessing gas content, the percentage voids must be measured to within 0.1 to 0.2 per cent. To achieve this, relatively expensive and delicate weighing equipment is required, and the test would normally require several minutes.

A test in which a cast sample is prepared for examination under the microscope has been described by Brace.[2] This test has the merits of ease of operation in the foundry and relatively low cost, but the result is not obtained rapidly and the sensitivity is inferior to the first two tests.

Radiography is used for the inspection of castings from the point of view of soundness, revealing both the amount and distribution of porosity. The equipment is very expensive, and therefore this method is only used where the equipment is already provided for other purposes.

Comparison of Tests

In comparing the various tests, it must be realized that the primary purpose of a test is to assess with sufficient accuracy the gas content of the melt and the question of cost, speed and ease of operation should only be taken into account when this requirement has been satisfied.

Applying this principle, it would appear that the most practicable method available is the vacuum-solidification test, with its combination of ease of operation and high sensitivity. There are various designs of vacuum solidification equipment, all based on the original Straube-Pfeiffer test (see Fig. 4). The main variations lie in the means adopted to prevent escape of gas bubbles from the sample as it solidifies. In the design of the British Non-Ferrous Metal Research Association, the crucible containing the sample, obtained by immersing a preheated steel crucible in the melt, is placed in a refractory triangle and cools in air. Ripson and Rosenthal[3] describe a method where the sample freezes in a clay/graphite crucible, an aluminium disc 0.2 to 0.3 in. thick being placed on the metal surface before solidification commences to prevent escape of gas during freezing. In the Author's laboratory, a method has been developed where the crucible is arranged in a metal cooling-block, with provision for a defined air gap between the crucible and the block, thus giving controlled but more rapid cooling. Fig. 5 shows the equipment used in this laboratory, and a cooling block fitted with spacing pieces to give an air gap of $\frac{1}{32}$ in. is shown in the centre of the table, in front of the vacuum gauge. The gas content can be estimated by observation during freezing, by the appearance of the upper surface, by sectioning or by density measurement. In Fig. 6, photographs or samples cast in the vacuum solidification equipment are shown, together with samples cast in the graphite mould. The samples are shown for three different alloys, *i.e.*, (*a*) LM 11; (*b*) LM 6 and (*c*) LM 4. The vacuum-solidification samples have all been produced under a pressure of 50-mm. mercury, and the percentage voids corresponding to each sample has been calculated from a sample cast at atmospheric pressure. In all cases, the graphite mould sample distinguishes between high and low gas-content, *i.e.*, between 1.6 and 0.5 per cent. voids, but will not distinguish between 0.5 per cent. and 0 per cent. voids. The density of a sample solidified under reduced pressure will, of course, be much less than that of a sample from the same melt

solidified at normal pressures. It has been suggested that the use of a suitable heavy liquid such as bromoform would permit the test to be used as an acceptance test, *i.e.*, by suitable selection of the liquid density, a sample low in gas would sink, and one with high gas content would float.

The vacuum-solidification method has been used not only for checking that the gas content is low but also, in the case of gravity die-castings, that the gas content is high enough to prevent the formation of shrinkage cavities and cracks.

Non-metallic Inclusions

Little work has been reported on the detection of oxide and other inclusions in melts. Some form of fracture test on a cast sample is probably the most reliable method available. A long flat test piece, say 6 by 2 by $\frac{1}{2}$ in. thick, which could be fractured in a number of places, is suggested as a possible first approach.

Grain Size

Any test for grain size requires careful control of metal and mould temperature. In many cases, grain size can be roughly estimated by the surface appearance of a cast sample, but where the grain size is critical, a sample must be prepared by machining and etching. Standard DTD-type sand-cast test-bars, or a smaller version, of $\frac{3}{4}$ in. dia. by 4 in. long, have been used for grain-size measurement. It is necessary to take into account the relative cooling rates of the test casting and the production casting when defining the permissible grain size.

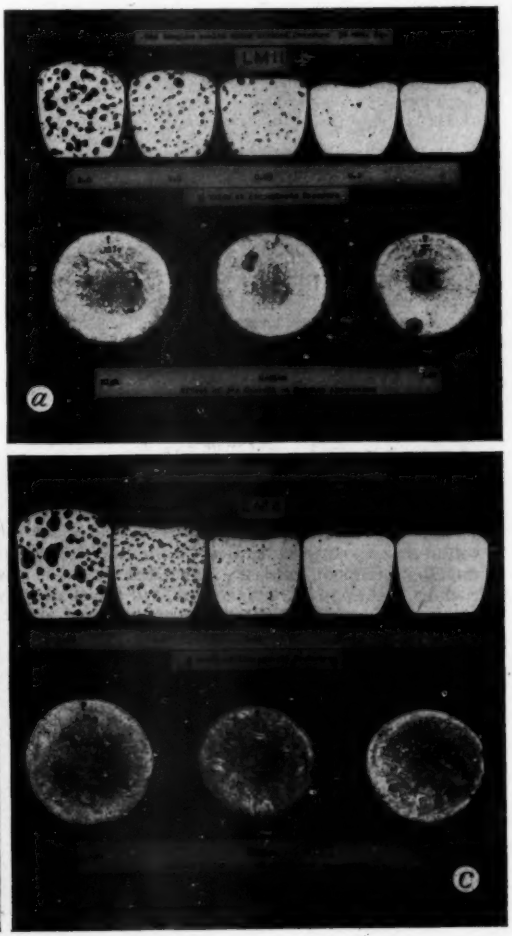
Group Tests

In the above comments, each of the three factors has been considered separately and special test-samples have been suggested in each case. A test-piece which made possible the estimation of all or even two of the factors would be preferable. The use of one sample to estimate grain-size and non-metallic inclusions is probably simple, but the reduced-pressure test-sample for gas content cannot be utilized for other tests. The graphite-disc sample offers the possibility of including all tests in one sample, but this would involve a greater sacrifice in accuracy than can be tolerated in assessing the gas content.

Although many foundries use the simple test similar to the graphite-mould test, very few foundries use the more accurate methods which are available. Where the reduced-pressure test is used, good control of melt quality has been achieved and has fully justified the effort expended.

(*Continued on page* 400 *at foot of col.* 2)

FIG. 6.—*Samples cast in the vacuum-solidification testing of three alloys: (a) LM.11; (b) LM.6; and (c) LM.4.*



Institute of Metals

Spring Meeting Report

An attractive programme, of interest both to the research worker and to the industrial metallurgist, was arranged for the Institute of Metals' Spring meeting held in London recently. The May lecture on the evening of March 29 was delivered by Prof. F. C. Frank, of the University of Bristol, on "The Nature of the Real Crystal." The annual general meeting, including the installation of the new president, Dr. Maurice Cook, F.I.M., presentation of Institute medals and students' essay prizes, and the presidential address took place on Wednesday. Papers discussed included "Refractories for Low-frequency Induction Furnaces," "Fatigue," "Control of Quality in Heat-treatment and Final Operations," "Constitution of Uranium Alloys," "Twinning," and "Deformation and Fracture of Zinc." A dinner and dance was held on the evening of March 31 at Grosvenor House, Park Lane, W.1.

Works visits were arranged to W. H. A. Robertson & Company, Limited, and W. H. Allen, Sons & Company, Limited, Bedford; K. and L. Steelfounders and Engineers, Limited, and Foster Instrument Company, Limited, Letchworth; Wild-Barfield Electric Furnaces, Limited, Watford; G. A. Harvey & Company (London), Limited, London; and Vauxhall Motors, Limited, Luton.

Metallurgical Trends

In his presidential address, Dr. Cook referred to some of the discoveries, innovations, trends and advances that appeared to be of outstanding interest, and of importance in their effect on the non-ferrous metals industry, and in enhancing the usefulness of its products. Confining his remarks to the period between the termination of the first world war and the present time, he pointed out that they were not intended as an historical survey but a noting of a few of those metallurgical happenings of recent years which had impressed him by their interest and importance. Proceeding, the speaker said the processes of melting and casting were still the major initial or primary operations of that part of the metallurgical industry which concerned the Institute, and no metallurgist needed reminding it was at this stage of manufacture that many of the imperfections and defects sometimes found in finished products had their origin. It was not surprising, therefore, that both processes had engaged the active attention of metallurgists for many years. It was in this field that they had made some of their greatest contributions to industrial progress.

After mentioning the papers published by the Institute on the subject of condenser tubes, the speaker, discussing aluminium, referred to the discovery of age-hardenable alloys which opened up a wide vista of possibilities for aluminium, when that metal was still in its infancy, and the development of alloys of this type contributed greatly to the growth of the light-metals industry and were to-day an important part of its production. From a level of about 5,000 to 10,000 tons at the beginning of the century the world production of aluminium had risen to about 3,000,000 tons in 1954, and in this country the output of semi-fabricated products in this metal and its alloys had increased three- or four-fold in the last 15 years. The purity of aluminium made by the reduction of alumina normally ranged from about 99 to 99.8 per cent. and whilst most of the current output consisted of qualities in that range of composition, high purity aluminium was becoming more and more important.

New Foundry Alloys

Continuing, the speaker said there were many instances of the remarkable and beneficial effects which could be produced in well-known alloys, both ferrous and non-ferrous, by small additions of elements other than the alloying ingredients themselves. For instance, aluminium-silicon alloys nowadays were a familiar group of light foundry alloys, and although they had been known for a very long time they only attained industrial importance after Pacz had shown that the properties of the eutectic alloy could be vastly improved by the addition of small amounts of sodium or other alkali metals. Much more recently there had been a comparable example of beneficial structural modification in the production of nodular cast iron by innoculation of the melt with a small quantity, that is, about 0.1 or 0.2 per cent., of cerium or magnesium, and irons so treated were far stronger and tougher than those in which the graphite was present in the usual flake form.

The last few years had seen the advent of titanium as a new industrial metal, and the technical achievements that had made this possible were amongst the most interesting in the period covered by the speaker. Spectacular advances had also been made in the use of physical instruments and methods for analytical control, and nowadays polarographs, absorptiometers, and spectrographs were normal items of laboratory equipment.

Melt-quali'y Tests — I Non-ferrous

(*Continued from page* 399)

(Mr. French, whose contribution was concerned with copper-base alloys, also showed two films. One concerned a process associated with a reverberatory furnace, but it could be applied equally to crucible melting. The second film illustrated the flow of metals in test-bar moulds.)

THE CHAIRMAN (Mr. F. Hudson) then said it was to have been his duty to open the general discussion. In view of the shortness of the remaining time available, he did not do so, but invited the members to express their views.

REFERENCES.

[1] Ransley C. E. British Patent 684,868.
[2] Brace A. W. *Proceedings* Inst. Brit. Foundrymen, 1952, XLV, A. 138.
[3] Ripson, S., & Rosenthal H. Report No. R-922, pp. 10, Oct. 1949, Frankford Arsenal.

Protection of Iron Castings against Rusting

The following are a few details about simple methods of protection against oxidation during the temporary storage of ordinary grey-iron castings. The information was furnished by the *Centre Technique des Industries de la Fonderie* as an answer to a query. This asked that the coating should have the following characteristics: Ease of application (by dipping since small castings were being considered); water and humid-air resistance; protection for at least a year; resistance during handling; and easy removal before use, especially when the castings have to be painted.

Two types of temporary protection appeared to satisfy the requirements:—

(1) *Wax coatings* made up from mixtures of waxes or petroleum distillation products, with a late addition of corrosion inhibitor. It can be used either in the liquid state (application temperature about 50 to 80 deg. C.) or diluted with solvents (cold application).

(2) *Plastic coatings* based on ethyl cellulose or cellulose acetobutyrate. They can be applied hot—at about 150 to 180 deg. C—or cold, diluted with solvents.

Coatings, which do not adhere to the metallic surface, are easily removed by a simple cut and by tearing off, like peeling an orange. They also have the advantage of forming a transparent envelope without changing the external appearance of the casting. No matter which type of coating be used, the castings must be degreased before application. This operation is simplified by the use of emulsified solvents. [This information comes from the January issue of the *Journal d'Informations Techniques des Industries de la Fonderie*.]

Tarnishing

An official statement issued by the National Chemical Research Laboratory on the experiments made on the use of chlorophyll as a tarnish preventive points out that the familiar tarnish that develops on articles of silver, copper, and their alloys during storage is the result of attack by sulphides (mainly hydrogen sulphide) present in small traces in urban atmospheres. Unlike the rusting of steels, the tarnishing of silver and copper cannot be prevented by storage in a dry atmosphere; the rate of tarnishing of silver is, in fact, a maximum at a low humidity.

The access of gaseous sulphide to metal objects may be diminished, in suitable cases by the application of a dry lacquer, or more generally by the use of a wrapping containing a substance that will convert the sulphide into some innocuous compound.

Work is now being carried out at the Chemical Research Laboratory, Department of Scientific and Industrial Research, on the development of such wrappings. A number of additives have been found effective, and they include chlorophyll, tannins (with and without the addition of alkali), and certain salts of chromic, phosphoric, and nitrous acids, particularly copper chromate and phosphate, zinc chromate, and lead nitrite.

Laboratory tests have been made with jewellers' tissue containing 5 per cent. by weight of the reactive absorbent material. The insoluble salts were deposited in the paper by double decomposition of soluble salts, the soluble product being washed out before the paper was dried. In successful tests, complete protection was given to test panels of silver, copper or brass by an 8- by 4-in. wrapping of impregnated jewellers' tissue (weighing 0.36 gm.) when exposed to one litre of air containing 0.01 gm. hydrogen sulphide. This concentration is about 80,000 times that of the sulphide (as distinct from total sulphur) believed to be present in a normal urban-industrial atmosphere, so the experimental test should represent a fairly lengthy exposure to the atmosphere in, say, a store cupboard where the replacement of air is slow. It should not always be necessary for the articles to be wrapped; good protection should be obtained by placing a suitable amount of prepared tissue, paper or wadding inside a closed cabinet or case containing the silver or copper ware.

Commercial Supply

The mass-production of the anti-tarnish tissue has now begun at Ashe Laboratories, Leatherhead, Surrey. A statement on this issued by the Laboratories says that patents have been filed covering the impregation of cellulose materials with these sulphide-absorbing compounds and Ashe Laboratories, Limited, in conjunction with the DSIR and the National Research Development Corporation, will shortly be producing an anti-tarnish tissue called Exair, impregnated with a special chlorophyll derivative, which gives maximum protection against the highest concentrations of hyrogen sulphide normally encountered in town air. At the moment two grades are envized—Exair AL/35, which is based on 8½-lb. extra-high wet-strength acid-free tissue, and Exair AL/36, a 7-lb. acid-free jewellers' tissue. Production in reasonable amounts is about to be commenced.

Field Tests on Free-standing Convector Fires

A report published in the March issue of the *Journal* of the Institute of Fuel describes field tests by the Domestic Appliances Laboratories of the British Coal Utilisation Research Association which were undertaken to compare the performance of free-standing open fires with restricted throats with ordinary open fires, under conditions of normal domestic operation. The authors are Mary Davison, B.A., D. E. Kimber, and R. E. J. Tullett, B.SC.

The results were obtained from a group of 39 households, all having living rooms in the same medium-size range. Twenty-seven of these used their own open fires during the first period of the test and were equipped with one of the two free-standing convector fires during the second period. The remainder used open fires throughout the test, and acted as a control group.

In addition to the measurements to obtain records of fuel consumption and inside air temperatures in the 39 households, more detailed explorations of temperature were undertaken in eight living rooms of the houses used in the tests while they were in use by the families, to compare the distribution and quality of warmth, during the evening period. These measurements were extended in the case of one unoccupied, but furnished living room, to tests lasting 10 hrs., in which the appliances were compared during days of equal outside temperature.

The results indicated that the free-standing convector fires resulted in a fuel saving of approximately 21 per cent., although they were operated for longer periods and were used to maintain higher levels of comfort. The measurements of warmth confirmed these results, and from both the evening and the 10-hr. tests it is possible to infer that the free-standing fires are of the order of 60 per cent. better than the open fire when judged on the basis of area of warmth per unit burning rate.

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Scots Foundry Jubilee

A company of 120—office, works, and sales staffs and friends—attended the annual staff dinner and dance of Lane & Girvan, Limited, ironfounders, Bonnybridge, at the Plough Hotel, Stenhousemuir, recently. It was presided over by Mr. James Ferguson, C.A., managing director, who referred to the company having recently attained 50 years of ironfounding and appliance manufacture. During that long period over 1½ million solid-fuel-fired stoves and cookers and a large quantity of varied builders' castings had been made and distributed in all parts of the world. Notwithstanding the fact that the market for some of these goods was now smaller than at one time, the company had maintained its output during recent years very near its best pre-war figure.

In introducing (as one of the principal guests) Mr. John Bell, president of the Institute of British Foundrymen, Mr. Ferguson outlined Mr. Bell's career in the ironfounding industry, stating that in 1912 he had introduced the first mechanized foundry in Scotland.

Scottish Foundry Developments

Mr. John Bell, in proposing the toast of the company, said that, like Lane & Girvan, the Institute had been founded in 1904 and had now over 5,500 members. He outlined the main developments of the industry over the last 50 years and showed how many of the problems which had to be solved nationally had also been successfully met in Bonnybridge. He explained the function of the Institute in promoting the interchange of ideas and the education of foundry personnel, including apprentices. He mentioned with pride that, after the successful Glasgow national conference of the Institute last year, the Bell Travelling Scholarship, amounting to £1,700, had been established for the benefit of young craftsmen.

Mr. Bell expressed the view that there was still a vast future in the ironfounding industry—particularly in the sphere of aircraft and automobile manufacture and other high-duty applications. He congratulated Lane & Girvan on the enterprise shown by them in setting up a high-duty-iron section recently.

Acknowledging the toast, Mr. Ferguson stated that he had considered what would be a suitable small memento to give Mr. Bell for finding time in a busy year of office to come to the function and he had finally selected a bronze plaque (which had been cast in the foundry) of the "Last Supper," after Leonardo da Vinci's mural in the chapel of Santa Maria della Grazie in Milan.

Returning thanks for the gift, Mr. Bell said he could not have received a more appropriate example of the craftsmanship of the light castings area of Scotland.

Mr. W. R. L. Ferguson stated that in the company there were two members of the staff who had served throughout virtually its entire history. They were Mr. John Stewart and Mr. John Sneddon.

Papers on Welding

The Council of the Institute of Welding announces that papers to be considered for the award of the Sir William J. Larke Medal of the Institute for 1955 must reach the secretary at the Institute's offices, 2, Buckingham Palace Gardens, London, S.W.1, not later than April 30. Particulars of the regulations for the award of the medal, for which non-members as well as members of the Institute may compete, may be had from the same address.

Revised British Standards

Zinc and its Alloys for Die-casting

Revised British Standards Nos. 1003 and 1004, 1955, were originally issued in 1942, when the development of dependable zinc alloys of good mechanical properties had resulted in a rapid increase in the use of zinc-alloy die-castings for engineering purposes. These alloys are based on the result of much research, and the chemical compositions chosen were those giving the optimum balance of properties. Since subsequent experience has shown that some allowance should be made for the loss of aluminium and magnesium during casting, their limits have been slightly modified in this revision.

The presence in these alloys of certain impurities which are found in zinc ores, may cause liability to intercrystalline corrosion with resultant dimensional instability and loss of strength. These impurities are therefore strictly limited in the basic zinc used for the manufacture of these alloys. Limits have also been included for other elements which were included in the previous edition under the heading "traces," and the same limits are included for the alloys. BS 1005, "Sampling and Analysis of High-purity Zinc and Zinc-alloys for Die-castings," and BS 1225, "Recommended Methods for Polarographic and Spectrographic Analysis of High-purity Zinc and Zinc-alloys for Die-casting," will in the future be revised to include methods for the determination of these additional elements.

Arrangements have now been made for the use of the BSI certification mark in connection with this standard. Manufacturers licensed by the BSI to use this mark are required to ensure that the whole of their production of zinc-alloy die-castings complies with Part 2 of the standard. Recommendations on the design and production of zinc-alloy pressure-die-castings are being issued in a code of practice for zinc-alloy die-casting for engineering, which is in course of preparation. Copies of this standard may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1. Price 3s. each.

Nuclear Energy in Kensington

On view at the Science Museum, South Kensington, London, is a large working model, lent by the United Kingdom Atomic Energy Authority, showing the "BEPO" atomic pile, the larger of the two pioneer atomic piles set up at Harwell. This pile went into operation in July, 1948, and is used for research purposes and for "cooking" the radioactive isotopes which are now widely used in medical research and treatment, in agricultural research, and in industry.

The model goes through a complete cycle of operations in five minutes and shows the working of the control and shut-down rods, which govern the heat output of the pile, and the movement of the hoist for loading uranium rods into the pile. These rods are the "fuel" which supply the energy to operate the pile. As during its operation some of this is "burnt up" and the rods become contaminated by the products of the burning, they have to be replaced and processed to remove the fission products.

The Science Museum is open on weekdays from 10 a.m. to 6 p.m. and on Sundays from 2.30 to 6 p.m. Admission is free.

ASSOCIATED ELECTRICAL INDUSTRIES, LIMITED, through their various companies are now employing 4,000 apprentices.

Approach to Foundry Mechanical Handling

Discussion of Mr. C. M. G. Wallwork's Paper

Mr. Wallwork's original Paper gave a very comprehensive introduction to handling and cost problems arising when considering the mechanization of a foundry. It dealt exhaustively with cost spreading, process flow, material-movement analysis, handling-equipment cost and overall planning. In the Manchester discussion recorded in what follows, it was clear that hand versus *machine production is still quite a controversial subject. Such topics as the transfer of labour at slack and busy periods; the need to keep everything on the move; scrap problems, and job evaluation were raised and dealt with.*

This Paper, which was printed in the JOURNAL of February 25, 1954, when given to the Birmingham branch, was repeated to the Lancashire branch of the Institute of British Foundrymen in their current session. Mr. Jackson presided.

After a vote of thanks had been accorded to Mr. Wallwork, the discussion was opened by Mr. SPENCELEY, who asked if the value of the floor area had been estimated?

MR. WALLWORK said this was primarily based on the cost of building itself; then to be included was heating, maintenance, repairs and so forth. In answer to a question as to discrepancies in weights of charges, Mr. Wallwork suggested that chargers should be paid piece-rate not on what they charged into the cupola, but on the total of castings, runners, etc., that came out of it. It then did not matter whether they recorded their charges as "light" or "heavy" from the payment point of view.

MR. SWINGLEHURST asked why the statutory holiday expenses were included on the "Foundry Costing Spread Sheet" exhibited.

MR. WALLWORK replied that it was because of the system of keeping the accounts, in which holiday and shut-down costs were spread over each working day of the year.

Manning

MR. FINCH asked whether it was preferable to under-man a plant and build it up, or to over-man initially and then cut down?

MR. WALLWORK said it was important to have what one would consider to be the correct proportion of men on the plant to begin with, rather than to try to secure a good output regardless of the number of men, and then reducing the number of men at a later stage.

MR. HALLIWELL asked whether the scheme detailed was suitable for a small foundry?

Mr. Wallwork said that even for a small foundry, someone, whether it be the foundry proprietor, foundry manager or foundry foreman, must obviously be responsible for planning what was going to happen; whether it was proposed to put in any sort of handling device, be it expensive or cheap. If the small foundryman could ascertain the necessary figures from his cost department, he could then decide whether the cost of any alteration in the method of handling would pay for itself.

MR. HALLIWELL asked for sources of information on this subject of costing and mechanical handling.

MR. WALLWORK replied that much information was available through the British Cast Iron Research Association's advisory team.

MR. JACKSON added that the Association of Bronze and Brass Founders operated an advisory service which was quite cheap for anybody in the non-ferrous section of the industry.

Slack Periods

MR. COLLINS referred to the transfer of workmen from one department to another. Assuming there came a slack period and it was decided to move a couple of men from one section to another, he asked whether their return would make any difference in costing.

MR. WALLWORK pointed out that there were two basic questions: (1) The question of displacing labour by the application of mechanical handling or other improved methods. A point generally accepted by both sides of industry and certainly by the British Productivity Council was that any men who were displaced by improvements in methods—in a foundry, or any other works—were in the long run (and taking the nation as a whole), bound to be re-employed elsewhere, because the wealth of the nation as a whole was sure to benefit from cost reduction and the greater demand for goods created. (2) Obviously, it was best to transfer men as necessary to where there was work for them. It was usually found that among, say, probably 15 per cent. of the employees, there was a far higher rate of labour turnover, and this fact enabled one to adopt improved methods without having to discharge anyone.

Obviously, the smaller the foundry, the more difficult became the problem, but it had been found that simply by ceasing to engage labour, the situation rectified itself very rapidly indeed. The wages of men only temporarily displaced should be removed from the section cost accounts and placed to general overheads.

Approach to Foundry Mechanical Handling—Discussion

Keeping Things Moving

MR. YEOMANS, in referring to the question of handling and materials, said one was inclined to overlook a basic principle, and that was, if one could keep materials on wheels it much reduced handling costs. While in the Productivity Team reports there were described some very elaborate handling systems, nevertheless he understood that the common wheelbarrow was still much used in America. One of the problems that had to be faced was that of providing more modern plant. The speed of development at the moment with foundry equipment was impressive; electronic control was becoming available. This necessitated a periodical review of the equipment available, and he asked what happened to the budget when the management adopted some of the current recommendations for improving foundry conditions, as these might of necessity involve a major capital investment?

MR. WALLWORK pointed out that foundrymen had had a pretty fair idea of what had been in store for the foundry industry, as it was about eight years since the "Garrett Report" was issued. The new "Iron and Steel Regulations" were the sort of things that were going to be enforced sooner or later in any case. As far as budgeting for expenditure of this kind was concerned, it did not really come under the heading of mechanical handling. Obviously, however, provision has to be made and the cost recovered in the price of castings. Also, there was another matter to consider —air pollution. Recently he visited some foundries in the United States where air pollution was taken very seriously indeed and all gases from the cupolas had to be washed, filtered and passed through electronic precipitators and so forth. In fact it cost very nearly as much to apply air-pollution prevention to a pair of cupolas as it did to build a new foundry. Luckily, he did not think foundrymen would have to go to such lengths in this country.

Scrap

MR. MURRAY asked for typical scrap losses when making 50 or 60 boxes per day. In the Paper, reference had been made to the manually-operated plant of 48 to 50 men where there was a scrap loss of 5 per cent. and then in the mechanized plant there were nine men making 50 to 60 boxes per hour each.

MR. WALLWORK said as far as scrap was concerned, it was certainly likely to be in the region of 12½ to 15 per cent. for the fully-mechanized plant, but in spite of that, such losses were amply covered by the greater return given. Nevertheless, the fact remained that if one halved the scrap one doubled the profit!

MR. HARPER said he had figured out roughly that the Author's firm seemed to be spending £750 a week on 50 tons output as against £500 for the manual plant—was this a correct deduction?

MR. WALLWORK agreed that it was.

Job Evaluation and Time-study

MR. COATES said he could appreciate that mechanical handling, in a large foundry where there were long runs, might be economical. Mechanical handling was no doubt more difficult to apply to short runs, and how could the cost be evaluated?

MR. WALLWORK said that basically the problem of the two types of foundries was similar—but only basically—in so far as that varied work had to be sub-divided into categories of one sort or another and also in that there would be a limited number of operators in the foundry. Of these, if, say, 20 were moulders they would be sub-divided according to the categories of work. It should be possible to set up output and cost standards for these particular sections. When referring to output standards, he did not mean tons of castings produced—that was far too variable a figure to work from so far as a costing system was concerned. With the use of time-study, a standard time was established for producing a certain job. Naturally there were hundreds of standard times in use in any week and there might be thousands of standard times altogether, for producing different jobs, but one did not necessarily need to have a time-study man to be able to develop a standard time.

The procedure for one job was to set the average piecework earnings made by a man in a week and divide by the number of hours that man was actually at work, to give a "wage factor." In other words, if one could imagine a man working 40 hours per week and earning 80 shillings' worth of piecework, then the wage factor was 80 divided 40, or two. Thus, to measure his output per week, the cost clerk worked back and divided this wage factor into piece/time earnings each week and it gave so many hours. If these were reasonably consistent from day to day and week to week, one could then assume the rate-fixing was reasonably accurate.

MR. COATES asked whether that method gave a realistic cost per figure per casting or per type of casting?

MR. WALLWORK said the answer depended entirely on the original rate-fixing. If one presumed that the rate-fixing was accurate, then the system was accurate. Although, he would never recommend the use of the method of assessment described where time study was available, at least it did give some yardstick upon which output and cost standards could be based.

Obviously there must be some basic standard in mind and obviously, too, a rate-fixer setting the rates had a pretty fair idea in his mind of what an hour was worth in terms of work done. The value of the method was that one could look back over a period and see just how good the rate-fixing was. For example, if a man earned 35 hours' bonus one week and 55 the next, it was pretty certain that on the second week the man had a "loose" rate and that there was something wrong with the rate-fixing.

MR. SPENCELEY asked, at the risk of being controversial, whether it really mattered if one had a

standard where like with like and production per man were compared. If, on the basis of experience, it was desired to get a closer assortment, it could be done over a period.

MR. WALLWORK said that he thought there was a fallacy in the statement. If there was a particular section surrounded by other sections where there were a lot of loosely-established jobs—at piecework prices—then it would be difficult to recognize the true state of affairs. Regarding the situation from the time-study man's point of view, however, one would probably see that there was much unnecessary work being done and paid for.

Hand *versus* Machine Moulding

MR. TAYLOR said some time ago branch members had visited a foundry which was producing castings by hand moulding, at the time, cheaper than the same firm could make them in another foundry with a highly-mechanized plant. This might seem confusing, but was one really cheaper than the other?

MR. WALLWORK said the question of which was the cheaper obviously depended on a large number of factors. However, one could say without much doubt that, generally speaking, the quantity-produced casting was cheaper than the one-off casting. Set against that was the particular example which Mr. Taylor had quoted and that was the sort of example which emphasized one of the points of this Paper. It could be said, however, that the planning in the mechanized foundry must have been neither very thorough nor very complete. Yet it was certain that the people responsible for the mechanization project would not have put down vast sums of money (which were required for a foundry of that type) unless they were convinced that it was possible to produce the quantity of castings they required cheaper. There were, therefore, two considerations. (1) Was the planning wrong in the first place? (2) Was the planning right and the execution wrong? He was not in a position to say, but obviously there was something wrong somewhere.

MR. BEECH said that if by hand methods it cost £1 to make a certain casting (for the sake of argument) and later the plant was mechanized and it then cost 21s. for the same casting, but at that price one could make four where one was made before, then a gain was registered.

MR. WALLWORK said that was a good point. If there was quantity demand and the loading could be retained, then mechanized production was obviously worth while. Individually, there might be smaller profit, but the output when multiplied by four presented a quite different picture, depending on what the overheads were, and so on.

New Catalogues

Industrial Vacuum Cleaning. A 32-page brochure (5010) and a folder (5302), have been received from the Sturtevant Engineering Company Limited, Southern House, Cannon Street, London, E.C.4. The latter only deals with model No. 4, which is fully covered in the brochure, wherein details are given of seven types of industrial vacuum cleaners. All are, of course, mobile. The smallest weighs 35 lb., whilst the largest is about 900 lb. The subject matter—cleaning of plant and equipment in industry—is important and in the near future, the British Cast Iron Research Association is organizing a conference on this subject of foundry atmospheres. It is a well presented, fully illustrated brochure, carrying all the essential data and available to those who write to Southern House.

Corebinders. A folder received from the Fordath Engineering Company, Limited, Hamblet Works, Albion Road, West Bromwich, takes the form of an instruction sheet for a rapid-baking range of products all incorporating the letters QD. Instruction data sheets are a modern essential in business, but only too often they are ignored on the grounds that it is too much trouble to read them or that the user thinks he knows better. This one is a straightforward statement and covers the mixing of materials for various types of cores.

Cast-iron Conveyor Pulleys. In publication 5416, Crofts (Engineers), Limited, Bradford, 3, illustrate and detail a wide range of pulleys, actually from 12 to 30 in. dia. with solid bosses and from 27 to 60 in. dia. with split bosses. The smallest size has a plate, whilst the balance have six spokes. Tables give the bore ranges for the four series listed. The catalogue is available to readers who write to Bradford.

House Organs

Wild-Barfield Heat-treatment Journal; No. 34, Vol. V. Published by the Company from Elecfurn Works, Watford, Herts.

This is a resurrection of a magazine which suspended publication in 1942, that is, during the last war. Since that time they and their associated companies have greatly extended their activities. GWB Furnaces, Limited, for instance, have acquired a licence to manufacture Tagliaferri furnaces. Thus the title of the house organ is no longer strictly applicable. The main article by Dr. Edwin Gregory, is certainly on heat-treatment, but there is also a description of an electric melting furnace. Readers desiring to be placed on the mailing list should write to Elecfurn Works.

Stantonian, Vol. 19, February 1955. Issued by Stanton Ironworks Company, Limited, near Nottingham.

Somewhere or other in this publication there ought to be the name and address of the company sponsoring the magazine; at the moment it is like our postage stamps, which never carry the name of the country of origin. This issue opens with a biography of Mr. G. R. Buckley, the works manager, who was promoted to the board last February. For the rest, this issue is devoted to all the manifold social events which centre around this great industrial enterprise.

Kelvin Hughes Industrial Review, Vol. 1 No. 1. Published by Kelvin and Hughes (Industrial) Limited, 2, Caxton Street, London, S.W.1.

This first issue is of the type which publicizes the scientific instruments manufactured by Kelvin and Hughes. It will be interesting to see how the bulletin develops.

New Trade Pact with Argentina

A new trade and payments agreement between Britain and the Argentine signed in Buenos Aires recently will remain in force until June, 1956. Announcing this in the House of Commons, Mr. R. Maudling, Economic Secretary to the Treasury, said that the new agreement was the outcome of negotiations which had been proceeding for some months on the basis of conclusions reached in the discussions with the Argentine ministers held in May in London. It took account of the changes which had taken place since the last agreement was signed in 1949, and particularly the progress that they had made towards freer trade and payments.

In this country, Mr. Maudling declared, most Argentine exports were now admitted on open licence and trade in all of them had been returned to private hands. So far as the export of capital goods to Argentina was concerned, it was estimated that with the help of the normal facilities available to exporters, including those of the Export Credits Guarantee Department, orders up to a value of £25,000,000 might be placed during the term of the agreement. The agreement envisaged that the trade between Argentina and the sterling area should be balanced at about £85,000,000 on each side, and, subject to the availability of sterling, the Argentine Government would issue licences to cover that figure.

Under the agreement Argentina will export to this country £34,000,000 worth of meat and a variety of other foods, as well as raw cotton and wool. Goods to be imported by the Argentine from Britain include coal, £1,500,000; tinplate, £2,300,000; iron and steel, unprocessed, £1,800,000; raw materials and motors for manufacturers of agricultural machinery, £3,400,000; spares for motor vehicles, £1,200,000; and spares and accessories for industrial and non-industrial machinery, £2,840,000.

British capital goods for export, estimated at £68,025,000, include machinery and equipment for the exploration, exploitation, and refining of petroleum; for mining exploration and exploitation; for the production, transformation, and distribution of electric power; for the iron and steel, metallurgical and mechanical engineering industries; transport equipment and material; machinery and equipment for communications and telecommunications; industrial machinery and equipment; and agricultural machinery.

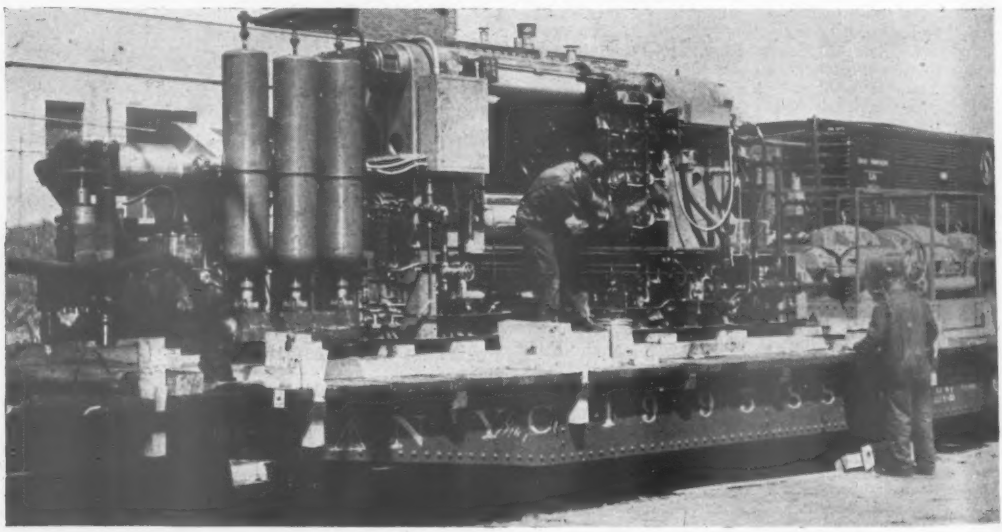
Financial Information to Workers

In the eyes of the Trades Union Congress all companies, whether public or private, should readily discuss their financial affairs with their workers and give them detailed information to make such talks effective. If they did so, it is stated, they would secure the real advantages that come from better industrial relations. In a memorandum to the British Institute of Management, which has appointed a committee to study the "disclosure of financial information to employees," the TUC says that what often happens now is that the unions go into negotiations with only scant knowledge of how employers' products are selling and of employers' "ability to pay." In such conditions it is impossible to create mutual confidence.

Costing information should also be given to workers, declares the TUC, which stresses that consultation with trade union representatives about these matters at an early stage is likely to receive a co-operative response, while general statements may lead only to indifference or even alarm.

Commenting on the TUC's suggestion, the British Employers' Confederation says that the question of giving financial information to employees is a matter to be decided by each employer. It would accordingly serve no useful purpose to attempt to issue guidance which purported to be of general application on the subject.

A 1,000-ton pressure-die-casting machine made by the American Hydraulic Press Manufacturing Company for the Kiekhaefer Corporation. Twenty-six feet long, it will make aluminium castings weighing up to 40 lb. and is capable of giving pressures up to 17 tons per sq. in.

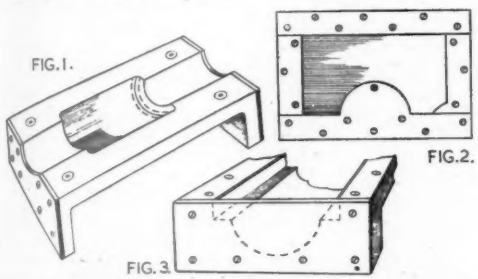


Steel Facing of Aluminium Coreboxes

By "Checker"

Metal coreboxes are usually made of aluminium or cast iron when being used for production of large numbers of cores. Of the two metals, aluminium is much easier to machine and finish off to the desired shapes and sizes, while cast iron, being a much harder metal, has the advantage of giving a better wearing-surface against the abrasive action of the sand. Another important factor which has to be considered with all but small coreboxes, is the weight.

Open ends and top faces of aluminium coreboxes are liable after a time to show signs of wear when in constant use. These surfaces can, however, be given a considerably better wearing face, and consequently longer life in the coreshop by the addition of suitable sheet or strip steel. This gives the hard-wearing surface only at parts where it is required most, yet still leaving the corebox considerably lighter in weight than if made of cast iron. This sheet steel, of say ¼-in. thickness, can be attached to the body of the corebox by counterhead steel screws, usually of $\frac{3}{16}$ or ¼-in. dia.



FIGS. 1, 2, *and* 3.—*Examples showing the application of steel facings to aluminium coreboxes.*

Fig. 1 gives an example of an aluminium corebox made in halves, of which one half is shown, although of course both halves are similar. Each end is reinforced with steel ¼-in. thick as shown, with the circular hole cut through to give the desired core shape. It will be noticed on the joint that four dowels are shown, for coreboxes which are to be constantly used this is much better than using two dowels. It gives a four-point location of the corebox halves, and thus ensures they will mate accurately for a much longer period before being returned to the patternshop for renewing the dowels.

Another useful purpose to which sheet steel can be put on coreboxes, is shown in Fig. 2. In this example it is used to enclose the ends of an aluminium corebox completely, to retain sand when ramming. The steel pieces are fixed in position after the corebox shape has been finished to size, thus there is no obstruction at the ends of the box while working or machining it to shape. It will also be noticed in this example that steel facing has also been provided at the corebox top.

With the knock-out type of aluminium corebox (Fig. 3), only the topface has to be steel faced to obtain the harder wearing surface. This is achieved by fixing four separate pieces of steel as shown. Facings applied in this manner will preserve the correct depth, and also, for a considerable period, prevent the corners from becoming rounded.

Other Applications

It often happens with coreboxes which are to be used on coreblowing machines, that aluminium has to be the metal used, although cast iron would be more satisfactory from the wearing point of view, if it were not for the excessive weight involved. Therefore it is often possible to get a satisfactory coreblowing corebox produced in aluminium by the addition of steel facings at the top and bottom. In some instances, when the shape permits or makes it necessary, steel reinforcement can be applied at various internal points which are liable to become worn. An example is illustrated in Fig. 4, which is for a multiple corebox made in halves dowelled together, and from which three cores at a time are produced.

For all the examples given, the method of securing the steel to the aluminium corebox is by counter-

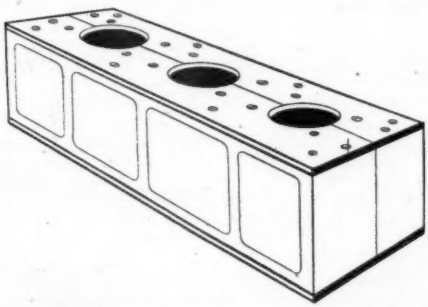


FIG. 4.—*Steel-faced corebox of a type designed for blowing three cores simultaneously.*

head screws. Clearance holes are drilled for these in the steel facing pieces, and countersunk to permit the screwhead to be level or just below the surface when in position. The continuation of these holes is necessary in the aluminium box, and in this part they must be tapped to suit the screw thread being used. Sometimes it is possible to drill through a wall or side of the corebox, and secure the screw by means of a nut at the other side. In all instances, when fixing steel facings, the corebox must be machined level to correct dimensions after the steel facing-pieces have been fixed. It is usually better for aluminium coreboxes to be steel faced before being put into production, once it has been decided that this will be done. Occasions arise, however, when coreboxes are used for a period, and then when signs of wear begin to show, are withdrawn from the coreshop for the necessary machining level, and fixing of steel facing pieces.

Company News

QUALCAST, LIMITED—An interim dividend of 7½ per cent. is announced. This is the same rate as before, but is payable on the capital enlarged by a one-for-two scrip issue. The dividend, therefore, is effectively raised by 2½ per cent.

F. PERKINS, LIMITED.—It is proposed to capitalize £1,300,000 from reserves and issue 2,600,000 10 per cent. ordinary shares, credited as fully paid, to shareholders in the proportion of one new share for each existing share held.

BRITISH ROLLMAKERS CORPORATION, LIMITED—A final ordinary dividend of 11 per cent., making 15 per cent. for 1954 (13 per cent.), is recommended. A free scrip issue of one for two is proposed. After taxes of £257,006 (£328,116) group net profit was £275,101 (£210,207).

R. W. CRABTREE & SONS, LIMITED, printing machinery manufacturers, of Leeds—The board recommends an ordinary dividend of 6 per cent. for 1954 on doubled capital (7 per cent. plus 1 per cent. not subject to tax). Group profit was £139,075 (£109,641) plus excess profits tax repayment of £13,987 (nil).

G. & J. WEIR, LIMITED, engineers and founders, of Glasgow—A sharp rise in earnings and a final dividend of 20 per cent., making 27½ per cent., against 21 per cent., are announced by the company. Group surplus jumped from £804,269 to £1,534,486 after all charges, including £1,530,430 (£1,546,742) for taxation.

HENRY BALFOUR & COMPANY, LIMITED, gas and chemical engineers, of Leven (Fifeshire)—An increase of the share capital to £275,000 by the creation of 500,000 ordinary 5s. shares and appropriation of £111,075 part of share premiums to make a free scrip issue of 444,300 ordinary shares is proposed by the directors.

LANCASHIRE DYNAMO HOLDINGS, LIMITED—The company recommends a final dividend of 11 per cent. making 15 per cent. for 1954 (dividend 12½ per cent. and bonus 1½ per cent.). Group profit was £540,262 (£505,454) before taxes of £283,872 (£291,813 less £16,266 excess provisions). It is proposed to make a free scrip issue of one for two.

HADFIELDS, LIMITED—With the accounts for the year ended October 3, 1954, the chairman (Lord Dudley Gordon) states that the reorganization and modernization scheme referred to last year is substantially complete. The greater part of the equipment is in use and results have fully justified the expenditure involved.

BRITISH ALUMINIUM COMPANY, LIMITED—With untaxed profits more than doubled in 1954, the final dividend is being raised from 6 per cent. to 8 per cent. The total for the year is, therefore, 12 per cent., against 10 per cent. in 1953. Manufacturing and trading profits reached £1,999,633, compared with £882,117, after depreciation of £631,534 (£575,652), and transferring £223,240 (£100,000) to plant replacement reserve.

A. REYROLLE & COMPANY, LIMITED, manufacturing electrical engineers, of Hebburn (Co. Durham)—Profit, before tax, increased from £3,047,258 to £3,166,401, but there was no liability for excess profits levy. Tax requires £1,519,294, against £1,888,153 for 1953 when £404,000 was absorbed by the levy, and the final result is a net profit of £1,647,107, an improvement of £488,002. A final dividend of 8¾ per cent. makes 15 per cent., against 13¾ per cent., less tax, and 2½ per cent., tax free, from a surplus realized on the sale of investment.

Contracts Open

The dates given are the latest on which tenders will be accepted. The addresses are those from which forms of tender may be obtained. Details of tenders with the reference ESB can be obtained from the Board of Trade, Export Services Branch, Lacon House, Theobalds Road, London, W.C.1 (telephone CHAncery 4411, ext. 738 or 771), unless otherwise stated.

BRAZIL, July 19—Maintenance workshop machinery, for the State Electricity Commission, Porto Alegre, State of Rio Grande do Sul. (ESB/6989/55.)

CLEATOR (CUMBERLAND), April 18—Electrically operated automatic crude sewage ejector, for Ennerdale Rural District Council. The Surveyor, Council Chambers, Cleator.

FORMOSA, April 22—Welding electrodes, lathe tools, grinding wheels, and heating elements for an electric furnace, for the Central Trust of China, US Aid Division. (ESB/6197/55.)

FORMOSA, April 26—Rock drilling tools and accessories, for the Central Trust of China, US Aid Division. (ESB/6428/55.)

INDIA, May 2—Two 6-ton mobile cranes, for the Chief Engineer, Madras Port Trust. (ESB/7400/55.)

NOTTINGHAM, May 9—Two centrifugal booster pumps and electric motors, for the City Council. (Deposit, £1 1s.)

USA, April 19—10-ton travelling crane, for the US Bureau of Reclamation, Denver, Colorado. (ESB/7048/55.)

Recent Wills

COOTE, A. P., a director of the Butterley Company, Limited, Derby £10,030

HASTIE, W. A., chairman of Manlove, Alliott & Company, Limited, manufacturing engineers and ironfounders, of Nottingham £11,275

TELFORD, J. C., late a director of E. C. & J. Keay, Limited, structural engineers and ironfounders, of Wednesbury and Henley-in-Arden £37,772

LEMON, SIR ERNEST J. H., former chief mechanical engineer of the LMS Railway, Director-General of Production, Air Ministry, 1938-40, Ministry of Production special adviser, 1942 ... ... £14,267

BLAKELEY, WILLIAM, formerly managing director of Firth Blakeley Sons & Company, Limited, gas chemical, and structural engineers and tank manufacturers, of Tadcaster (Yorks) £14,121

PIGOTT, SIR STEPHEN J., former managing director of John Brown & Company, Limited, president of the Institute of Marine Engineers, 1937-38, and a member of the technical committee of Lloyd's Register of Shipping, 1933-52 ... ... £116,461

GRAHAM, J. T., assistant managing director of Worthington-Simpson, Limited, pumping machinery manufacturers, of Newark (Notts), part-time member of the East Midlands Electricity Board, and vice-chairman of the North Midlands Regional Board for Industry £18,396

INTESTATE

HEY, J. O., proprietor of Schofield's Foundry Company, Littleborough (Lancs) £19,634

Changes of Name

Among the companies which have recently changed their names are those listed below. The new titles are given in parentheses.

SMITHS (FOUNDRY), LTD., Oliver Road, Bury Road, Rochdale, Lancs (J. Marsden Foundry Co., Ltd.).

WRIGHT & WEAIRE (TOOLS), LTD., All Hallows Works, Park Lane, Tottenham, London, N.17 (Rendar Instruments, Ltd.).

J. HOBSON & COMPANY (ENGINEERS), LTD., Roebuck Road, Chessington, Surbiton, Surrey (Stock & Warland (Engineers), Ltd.).

JENNENS BROS. (METAL PRODUCTS), LTD., 48, Birmingham Road, Sutton Coldfield (Jennens Bros. (Metal Products), Ltd).

AMCO MODEL ENGINES, LTD., manufacturers of electronic apparatus and tubes, of Sunleigh Works, Sunleigh Road, Alperton, Middlesex (F. F. Wells (Engineering), Ltd.).

Indian Iron and Steel Industry Expansion

British, German and Russian Interests

In the past two or three years steelmaking firms in India have given serious consideration to the question of expansion and modernization, while in the last 12 months a number of plans for establishing State-owned steelworks have been formulated. As a result of recent negotiations, at least three new works, each with a capacity of 1,000,000 tons, are likely to be built, while a proposal for a fourth large plant has been made. The following article, based on information supplied by the British Iron and Steel Federation, briefly reviews new proposals, aimed at bringing Indian steel production eventually up to 6,000,000 tons p.a.

In 1948, the Indian Government declared that their ultimate intention was to nationalize the industry, but that no immediate action was to be taken and the position would be next reviewed in 1958. The effect of that statement was to add to the difficulty in obtaining further capital for the industry from either the home market or overseas. However, the steel industry is officially regarded as one for whose further development "the State is responsible, except to the extent that the co-operation of private enterprise is from time to time considered necessary." It may be said that much of the equipment in the existing industry needs modernizing. The strain of wartime demand subjected plant and equipment to abnormal wear and tear, and after the war firms had insufficient capital for the required large-scale modernization and expansion. The Indian Government has been faced with the same difficulty, and tardiness in establishing a State steelworks has been largely due to lack of finance, although another difficulty in the years up to 1952 was to find plant makers who were in a position to supply new equipment and to modernize older plant. Today, however, the whole situation has changed, for not only has India found the necessary finance, but manufacturers are now seeking orders in a very competitive market.

Financial Aid

Part of the finance required for expansion in the private sector of the industry has been made available by the Government, both directly through loans, and indirectly by raising retention prices, and also by insisting that special depreciation allowances be set apart and used for implementing a programme of plant renewal, replacement and extension. The steel companies themselves, from their current rate of operation, could allow no more than £22.4 million for expansion and replacements over the five-year period, yet it is estimated that a further £31,400,000 was necessary. The Government has come to the aid of the companies, and in the case of Tata has granted a loan of £7,500,000 for raising finished-steel capacity from the present annual level of 780,000 tons to 931,000 tons by 1957-58. The Indian Iron and Steel Company, besides a large increase in pig-iron capacity, is to increase annual finished steel potential from 350,000 tons to about 700,000 tons by the end of 1957, and has received from the Government a repayable advance of £7,500,000 and an ordinary loan of £2,150,000. This is in addition to the £3,750,000 previously granted and to the £11,250,000 from the World Bank, which is being guaranteed by the Government. The Mysore Iron & Steel Company has received a loan of £300,000, while other Government commitments for loans to steel development schemes amount to some £3,000,000.

Changes in Company Structure

Government financial assistance has not been granted without the companies agreeing to some fundamental changes in their structure. It was Government pressure which brought about the amalgamation of the Steel Corporation of Bengal with the Indian Iron & Steel Company on January 1, 1953. The Government has also secured participation in the direction of the companies by having its own nominees functioning as directors. Tata's long-standing proposal to convert its deferred shares into ordinary units was also supported by the Government and this resulted in shareholders accepting the scheme.

While the expansion and modernization programmes of the existing steel companies were being agreed, the possibilities of the long-discussed new State plant were also under discussion. An offer from a Japanese group suggesting Indo-Japanese co-operation in setting up a new steel plant was seriously considered, but negotiations broke down on Indian insistence that all control and management should remain in their hands. Nevertheless, the Japanese negotiations served one useful purpose, for they led to offers of assistance in establishing a new steel plant being received from various plant-making firms in several parts of the world.

German Plant

The Indian Government finally came to an agreement with the German concern Krupp-Demag A.-G., with whom they signed an agreement in Bonn in August, 1953, to plan a steelworks at Rourkela in Orissa. Originally, the plant was to have an initial annual ingot capacity of 500,000 tons with provision for doubling that potential within three or four years, but it has now been made clear that the project is to be revised immediately to 1,000,000 tons. Contracts, however, will not necessarily go to Germany, but will depend upon what offers are received from other countries. The Germans expected that the initial plant of 500,000 tons capacity would be working within a period of four years, provided the ancillary facilities, such as railways, water and electricity were available. A concern known as the

Indian Iron and Steel Industry Expansion

Hindustan Steel Company has been formed with an authorized capital of £75,000,000 to implement the agreement. The total capital cost of the initial project is estimated at £53,300,000, of which Krupp-Demag is to supply as a loan about £7,000,000. The balance of the share capital will be found by the Government of India. The German investment will be for a definite period of 10 years with the possibility of an extension. In this connection the Krupp concern has secured a credit of £4,300,000 for a total of eight years, the Frankfurt Export Credit Institute covering the first four years, while the Federal Government has agreed to step in and cover the period 1957-61.

Russian Plant

Recently the Indian Government has signed an agreement with the Soviet Union to build a plant with a capacity of a million tons producing some 750,000 tons of finished products at Bhilai in Madhya Pradesh; this is, however, subject to ratification. Full cost of the project is estimated at £75,000,000, which will include the development of the site and building of the township. Of this amount, the Soviet Union will supply about £33,000,000 of plant, machinery and equipment, all f.o.b. Black Sea or Baltic port, the amount to be repayable in rupees in twelve annual instalments at the very low rate of 2½ per cent. interest. If the agreement goes through, the works will from the outset be entirely controlled by the Indian Government. While this will be the second steel plant established in India with foreign assistance, it will be the first major project outside the Communist block to be financially aided and constructed by the Soviet Union.

The plant is to be in operation by the end of 1959, although certain departments, including three batteries of coke ovens, two blast furnaces and two open-hearths, are to be ready by December, 1958. According to the current agreement the annual capacities of rolled products will eventually be:— Rails, 100,000 tons; heavy structurals, 175,000 tons; sleeper bars and crossing sleepers, 90,000 tons; merchant bars, 235,000 tons; billets, 150,000 tons. Pig-iron output will be between 100,000 and 300,000 tons of foundry.

British Proposals

The Indian Government's policy of insisting that new undertakings in the iron and steel industry must be predominantly State-owned recently led to the failure of negotiations between the Metallurgical Equipment Export Company, Limited (MEECO), of London, and a group of Indian industrialists for building and operating a privately-owned steelworks at Durgapur in West Bengal. The British proposals, however, were then submitted direct to the Indian Government for consideration, backed by an indication from the British Government that financial assistance on a long-term credit basis would be available through the export credit guarantee department for a State-sponsored development exactly as it would be for a privately-owned enterprise. The offer has been "accepted in principle."

The proposals are for the construction of an integrated steelworks with an annual capacity of 920,000 ingot tons, representing some 700,000 tons of rolled products. The plant is expected to produce medium and light structurals, medium and light rails, sections, flats and wire rod. While no final decision has yet been made by the Indian Government on the actual site, current reports indicate that it is almost certain to be Durgapur, near Calcutta. Apart from the advantage of a location conveniently near to one of its principal markets, a plant at Durgapur would have easy rail access to the ore and coal deposits of Bihar and Orissa, while the nearby River Hooghly would ensure adequate water supply and also cheap transport by sea-going vessels to Southern India.

A fourth State steel plant has recently been mentioned by Mr. K. C. Reddy, Minister of Production, who suggested that a pilot plant should first be installed in Southern India based upon the use of lignite, large deposits of which have recently been discovered at Neiveli in Madras State; and that, if successful, a large plant should be built. No mention, however, has been made of any foreign technical or financial aid for such a project, although both French and Czechoslovak interests have recently indicated that they would be interested in building a steel plant in India.

Costs and Prices

India is well situated for the production of iron and steel. Moreover, the average annual income of an Indian steelworker is between £150 and £180, which is very low in comparison with that of European steelworkers, but living costs are also much lower. Under the steel pricing system, each of the main Indian producers receives "retention prices" for the products. The Government fixes these prices periodically, being guided by reports of the tariff commission; the prices fixed are ex-works and are based on costs which, for this purpose include gross return on fixed capital, depreciation, etc. Selling prices, on the other hand, are the prices at which home or foreign steel can be purchased in India. The Government are also responsible for fixing these prices, which are computed on the basis of the retention prices plus a surcharge which is adjusted from time to time. The surcharge is paid into an equalization fund used by the Government to offset the higher cost of imported steel, thus levelling up home and imported prices and thereby creating standard steel prices for the whole country.

Aluminium-alloy Sections for Marine Use

Data on three series of new aluminium-alloy sections having particular value in shipbuilding are contained in an addendum to Information Bulletin No. 18, published by the Aluminium Development Association, 33, Grosvenor Street, London, W.1. The three ranges of sections are bulb angles for riveting, and bulb plates and tee bars for welding. In each case data comprise an outline of the section with dimensions and properties. A brief account of the basis and development of these sections includes a note on the aluminium alloys in which they will in general be made.

Pig-iron and Steel Production

Statistical Summary of January Returns

The following particulars of pig-iron and steel produced in Great Britain are from statistics issued by the British Iron and Steel Federation. Table I summarizes activities during the past six months. Table II gives production of steel ingots and castings in January, and Table III, weekly average production of finished steel. Table IV gives the production of pig-iron and ferro-alloys in January, 1955, and furnaces in blast. (All figures weekly averages in thousands of tons.)

TABLE I.—*Iron and Steel Price Index and General Summary of Pig-iron and Steel Production.*

Period.	Price Index, 1938 = 100.			Iron-ore output.	Imptd. ore used.	Coke to blast-furnaces.	Pig-iron, ferro-alloys prod.	Scrap used in steel prod.	Steel (incl. alloy).			
	I. & S.	Coal.	All comdts.						Imports.[1]	Prod. Ingots, castings.	Delivrs. finished steel.	Stocks.[2]
1952[3] ..	254	329	323	206	190	228	202	171	29	310	252	683
1953	260	350	323	304	207	237	215	188	18	339	262	962
1954—August	265	365	325	266	238	237	227	177	5	326	229	1,128
Sept.[4]	265	365	324	293	231	232	223	212	7	372	293	1,063
Oct. ..	265	365	324	304	237	236	231	210	3	374	292	973
Nov. ..	266	372	326	302	241	241	235	211	6	377	303	900
Dec.[4]	267	372	331	301	236	240	234	196	7	355	285	831
1955—Jan. ..	268	373	333	304	243	240	236	213	11	381	—	828

TABLE II.—*Production of Steel Ingots and Castings during January*, 1955.

District.	Open-hearth.		Bessemer.	Electric.,	All other.	Total.		Total ingots and castings.
	Acid.	Basic.				Ingots.	Castings.	
Derby, Leics., Notts., Northants and Essex ..	—	3.7	13.4 (basic)	1.8	0.2	18.2	0.9	19.1
Lancs. (excl. N.W. Coast), Denbigh, Flints., and Cheshire	1.6	30.1	—	2.3	0.4	33.0	1.4	34.4
Yorkshire (excl. N.E. Coast and Sheffield) ..	—	38.9	—	—	0.1	38.8	0.2	39.0
Lincolnshire	1.8	71.5	—	1.2	0.4	73.1	1.8	74.9
North-East Coast	2.5	37.3	—	1.3	0.6	40.2	1.5	41.7
Scotland	—	19.2	—	1.2	0.7	19.2	1.9	21.1
Staffs., Shrops., Worcs. and Warwick	5.3	77.1	6.6 (basic)	1.3	0.1	89.7	0.7	90.4
S. Wales and Monmouthshire	9.0	31.7	—	11.1	0.5	50.5	1.8	52.3
Sheffield (incl. small quantity in Manchester) ..	—	1.5	5.5 (acid)	0.6	0.1	7.6	0.1	7.7
North-West Coast	20.2	311.0	25.5	20.8	3.1	370.3	10.3	380.6
Total	17.2	292.4	23.2	18.7	3.2	344.7	10.0	354.7
December, 1954[4]	19.3	298.6	20.9	17.9	3.6	349.7	10.6	360.3
January, 1954								

TABLE III.—*Production of New Non-alloy and Alloy Finished Steel.*

Product.	1953.	1954.	1953.	1954.	
			Dec.[4]	Nov.	Dec.[4]
Non-alloy steel:					
Ingots, blooms, billets and slabs[5]	4.7	5.1	4.2	5.8	4.9
Heavy rails ..	8.7	9.6	8.8	10.1	8.5
Sleepers, etc. ..	2.2	1.9	1.7	1.6	1.8
Plates, 3 mm. thick and over ..	46.5	47.0	49.0	47.3	49.0
Other heavy prod.	43.9	45.8	42.3	47.7	45.0
Ferro-con. rods, etc.	5.1	5.9	4.8	7.0	6.4
Wire rods and other rods	15.6	19.7	16.5	23.4	21.2
Light rolled prod. ..	44.2	41.2	36.8	47.3	43.3
Bright steel bars ..	6.7	6.3	5.7	7.6	6.9
Hot-rolled strip ..	18.8	21.7	19.6	25.0	21.5
Cold-rolled strip ..	5.2	7.0	5.7	8.2	7.2
Sheets, incl. coated	34.1	38.8	35.0	42.6	40.4
Tin, terneplate and blackplate ..	14.9	16.8	15.4	16.8	17.4
Steel tubes, pipes	20.1	20.0	19.2	23.5	20.8
Tube, pipe fittgs.	0.3	0.4	0.3	0.5	0.4
Tyres, wheels, axles	4.4	4.7	4.8	5.0	4.3
Forgings (excl. drop forgings) ..	3.1	2.6	2.7	2.6	2.3
Steel castings ..	4.0	3.9	4.3	4.0	4.3
Tool and magnet steel	0.3	0.3	0.3	0.3	0.2
Total	282.8	298.7	277.6	326.3	305.8
Alloy steel	13.7	13.2	12.3	15.1	13.2
Total deliveries from U.K. prod.[6] ..	296.5	311.9	289.9	341.4	319.0
Add: Imported finished steel ..	6.8	5.0	6.5	6.5	6.3
	303.3	316.9	296.4	347.9	325.3
Deduct: Intra-industry conversion[7] ..	42.6	41.5	39.7	46.2	41.8
Total net deliveries of new material ..	260.7	275.4	256.7	301.7	283.5

TABLE IV.—*Production of Pig-iron and Ferro-alloys during January*, 1955.

District.	Furnaces in blast.	Hematite.	Basic.	Foundry.	Forge.	Ferro-alloys.	Total.
Derby, Leics., Notts, Northants and Essex	26	0.5	18.7	24.6	1.2	—	45.0
Lancs. (excl. N.W. Coast), Denbigh, Flints. and Cheshire ..	6	—	13.9	—	—	1.3	15.2
Yorkshire (excl. N.E. Coast and Sheffield) ..	—	—	—	—	—	—	—
Lincolnshire ..	10	—	33.6	—	—	—	33.6
North-East Coast	22	4.8	48.6	—	—	1.4	54.8
Scotland	9	0.9	14.9	1.7	—	—	17.5
Staffs., Shrops., Worcs., and Warwick ..	7	—	8.8	1.5	—	—	10.3
S. Wales and Monmouthshire	9	5.0	33.1	—	—	—	38.1
Sheffield	2	—	3.3	—	—	—	3.3
North-West Coast	8	17.3	—	0.2	—	1.1	18.6
Total ..	99	28.5	174.9	28.0	1.2	3.8	236.4
December, 1954[4]	99	29.3	172.4	27.0	1.0	3.9	233.6
January, 1954 ..	105	27.6	167.8	29.4	1.1	3.7	229.6

[1] Weekly average of calendar month.
[2] Stocks mainly ingots and semi-finished at the end of the years and months shown.
[3] Average 53 weeks ended January 3, 1953, all tables.
[4] Five weeks, all tables.
[5] Other than for conversion into any other form of finished steel listed.
[6] Includes finished steel produced in the U.K. from imported ingots and semi-finished steel.
[7] Material for conversion into other products also listed in this table.

New Equipment

Powered Ventilator

A new type of ventilator has recently been introduced to the market by P. M. Walker & Company (Halifax), Limited, Alexandra Works, Halifax. It has the advantage that during inclement weather, or at night when ventilation is not required, the heat loss is reduced to a minimum by reason of the fact that the ventilator is automatically sealed by means of shutters when the fan is stopped. The shutters, which are shown in the illustration, Fig. 1, are constructed of stainless steel and carried in self-oiling bronze bushes, requiring no maintenance. The body of the unit is of steel sheet, galvanized after manufacture and sprayed three

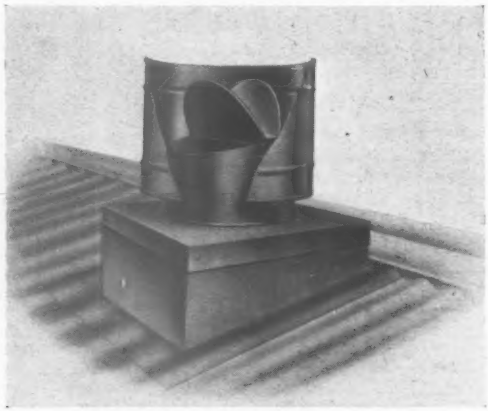


FIG. 1.—*Walker "Upblast" powered roof ventilator, with a section of the wind guard cut away to show the hinged closing flaps.*

coats of chlorinated rubber before despatch, or alternative materials are available. The heart of the unit is a Walker propeller fan fitted with totally-enclosed ball-bearing motor, which complies in all respects to BSS 168 or 170, and is suitable for continuous running in ambient temperatures up to 105 deg. F., or, if necessary—by special windings and silicone-grease-packed bearings—up to 250 deg. F. Moisture-proof motors are also obtainable for working in saturated atmospheres.

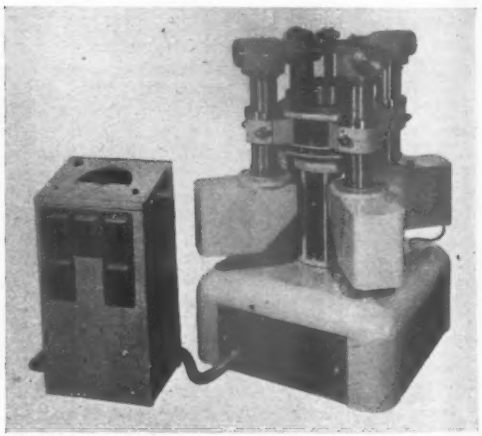
The unit has been specifically designed for arduous duty and highly efficient service in the rapid removal of contaminated or vitiated air, which is driven upwards at high velocity. The unit is claimed to be completely waterproof in either the running or closed position and the rigidly constructed wind-guard prevents interference from high winds. Six sizes of unit are available, having air-movement ratings between 2,000 and 27,000 cub. ft. per min.

Automatic Brushing Machine

To produce the automatic brushing machine for gears, shown in Fig. 2, it is obvious that the Elgro Machine Tool Company, Limited, of Minerva Road, Park Royal, London, N.W.10, must have undertaken much research and experiment. When gears leave a hobbing machine they usually carry on one side at the ends of the teeth a quantity of burrs, needing hand filing for their removal. The new machine eliminates all hand labour by carrying out automatically all the operations needed to clean gears before the finishing process is commenced.

This machine consists of a central oscillating spindle upon which the gear to be cleaned is mounted by means of a self-clamping mandrel. Surrounding this spindle are four rotary wire brushes each driven by a separate motor with speeds adjusted to suit the material used in the gear. The total horsepower of the machine is about five. The length of the cycle can be controlled in such a manner that up to 25 oscillations may be performed per complete working cycle; larger numbers of oscillations can also be provided for if required. When the gear has had all burrs removed it is automatically lifted clear of the brushes. This machine, for which world Patents have been applied, is claimed to be adaptable for all types of gears up to 2 ft. dia. and well suited for introduction into existing production lines. It will, no doubt, be of particular interest to the automobile and aircraft and general engineering industries. It will be shown for the first time at the Castle Bromwich section of the British Industries Fair on stand D.145.

FIG. 2.—*"Elgro" automatic brushing machine for gear teeth.*



Continuous Furnaces. G. W. B. Furnaces, Limited, P.O. Box 4, Dibdale Works, Dudley, Worcs., have issued leaflets covering five types of continuous furnace—chain and slat mesh-belt; walking beam; wire-and-strip pull-through, rotary-hearth and vertical-conveyor types. It is really only the last one which is of foundry interest as it illustrates and describes a furnace suited for the heat-treatment of castings.

Dust Removal. From Acme Conveyors Limited, 22, Hans Road, London, S.W.3, an informative, well-illustrated brochure of American origin has been received. It deals with the "Air Tumbler," an apparatus which removes the dust from the atmosphere of the shop, and returns the cleaned air to the room. The brochure explains in considerable detail just how the plant operates.

News in Brief

THE EIGHTH ANNUAL CONFERENCE of Incorporated Plant Engineers, will be held at the Hotel Majestic, St. Anne's-on-the-Sea, from May 18 to 20.

THIS YEAR, the well-known Birmingham firm of master patternmakers, Fellows & Darby, Limited, celebrate the sixtieth anniversary of its establishment in 1895.

A DINNER AND ENTERTAINMENT was held at the Derby works of International Combustion, Limited, on April 1 for over 100 members of the staff who have completed 20 years' service or more with the organization.

DURING MARCH, tractors and ancillary equipment valued at more than £1,000,000 were despatched by David Brown Tractors (Engineering), Limited, a record for the company in production and monthly output value.

THE SECOND International Industrial and Technical Exhibition of Charleroi, Belgium, will be held from September 17 to October 2, and cover mechanical and metallic construction, iron and steel metallurgy and founding.

EMPLOYEES of W. H. Dorman & Company, Limited, Stafford, made presentations, on April 1, to Mr. H. F. Smallwood, chairman and managing director, and Mr. G. C. Saunders, director and secretary, on their retirement from those appointments.

STAINLESS STEEL made by Firth-Vickers Stainless Steels, Limited, Sheffield, is used in the fittings on Britain's new 20,000-ton passenger liner, Southern Cross, which recently set out on her maiden voyage. The ship is of revolutionary design, with engines and funnel structure aft, and is the first all-passenger liner to be built in this way.

THIS YEAR, the British Compressed Air Society celebrates its silver jubilee. Its offices are now at 32, Victoria Street, London, S.W.1. At a council meeting following the annual general meeting over which Mr. J. T. Holman presided, Mr. J. R. Quertier (Consolidated Pneumatic Tool Company, Limited), was appointed president.

THE PYRENE COMPANY, LIMITED, metal finishing division, Great West Road, Brentford, Middlesex, announce the development of spray-gun bonderizing, an extension of the bonderizing range of paint-bonding processes. It meets the demand for a phosphating solution which can be applied at room temperature by means of an ordinary paint spray-gun.

THE SHEFFIELD OFFICE of the Export Credits Guarantee Department is now at Orchard Chambers, 27a, Church Street, Sheffield, 1 (telephone: Sheffield 29151). The office, which covers Sheffield, Barnsley, Doncaster, Lincolnshire, north Nottinghamshire, and part of east Derbyshire, was previously at Fargate House, Fargate, Sheffield.

VICKERS-ARMSTRONGS, LIMITED, announce that the contract for the supply by them of 100 Centurion Mk. 3 tanks and spares equipment to the Swiss Government was signed in Berne on March 31. The decision of the Swiss Government to choose Centurion tanks follows exhaustive competitive trials with different types of tanks over varying conditions of Swiss terrain.

CRAFTSMEN employed by Clarke, Chapman & Company, Limited, marine and electrical engineers, boilermakers, etc., of Gateshead, have constructed a scale model of an ore-handling plant which will be on show at the International Trade Fair at Toronto (Canada). The model, 20 ft. square and 12 ft. high, is operated electrically and has taken over two years to build by the company's employees working in their spare time.

THE NATIONAL INDUSTRIAL FUEL EFFICIENCY SERVICE and the Combustion Engineering Association are organizing a conference on "Smoke Reduction in Industry on the North East Coast." It is to be held at the Royal Station Hotel, Newcastle-upon-Tyne, on April 20, 1955. Amongst the Papers to be given is one on "Smoke Reduction in Factories"—(in Furnaces and Foundries)—by Mr. Clyde Hicks, M.I.B.F., A.I.M., Rolls Royce, Limited.

FOR THE PAST 12 MONTHS test borings have been carried out at Murvey on the Connemara coast to find out how much molybdenite ore is in the area. Recently Prof. W. R. E. Jones, leading Government consultant on mining geology, visited the area and it is expected he will soon make a report to the Eire Government. On this report depends whether the working of the deposits of this rare ore would be a commercial proposition.

A COMPLETE bucket idler for a dredger has been supplied by the Edgar Allen steel foundry to the order of F. W. Payne & Son, Bickley, Kent. The body of the idler is in cast steel and weighs 145 cwt., measuring 9 ft. 3 in. o.d. and 3 ft. 7 in. wide over the tread; length through the centre boss being 8 ft. 3 in. Twenty manganese-steel wearing plates of 1 cwt. 2 qr. each, are bolted to the bucket, the total fitted weight of which is 11½ tons.

AT LEEDS ASSIZES on March 30, Mr. Justice Byrne gave judgment for £1,250 with costs by consent to the plaintiff, Frank Whitwam, aged 39, machine moulder, of Thorncliffe Street, Lindley, Huddersfield, who claimed damages against Thomas Broadbent & Sons, Limited, ironfounders, Queen Street South, Huddersfield, for injuries received while working for them in July, 1952. As the result of a moulding-box falling on him, Whitwam had to have his forearm amputated.

Mr. FRANK HURST, chairman of Samuel Osborn & Company, Limited, Clyde Steel Works, Wicker, Sheffield, addressed the Sheffield Junior Chamber of Commerce, on March 30, on the subject of "The Urgent Needs of Industry To-day and To-morrow." He said that the present managerial age was soon to be followed by the age of industrial relations. He was convinced that much of the frustration of management was due to politics entering into their daily relations and actions.

A MEETING of European producers of investment castings was held in Paris on January 25 and 26 for the purpose of establishing personal contact and discussing problems of common interest. Among the companies represented were principal firms of France, Great Britain, Germany, Holland, Sweden and Switzerland. It was unanimously agreed to hold another meeting in Zurich during September, 1955, which is to be prepared by a committee of one representative of each country mentioned above.

KENT-NORLANTIC, LIMITED, of Toronto, a subsidiary of George Kent, Limited, Luton, England, are exhibiting a wide range of their industrial measuring instruments and controllers at the Canadian International Trade Fair at Toronto, which will be held from May 30 to June 10. On the basis of the progress already achieved by this subsidiary in serving Canada's industry with a restricted range of industrial meters and instruments, it has now been decided to release a much wider range of Kent products for sale in Canada.

THE EFCO GROUP OF COMPANIES has been reorganized in the form of a holding company and four subsidiary companies. The holding company will be known as EFCO, Limited, and will provide general administrative services for the other companies of the group. The Electric Furnace Company, Limited, will become a sub-

News in Brief

sidiary company, but will continue to design and manufacture the same range of products as before. The remaining subsidiaries, Electric Resistance Furnace Company, Limited, Electro-Chemical Engineering Company, Limited, and EFCO-Industrieofen, A.G., will not be affected by the reorganization.

Mr. J. R. KNIGHT, of the Mond Nickel Company, Limited, Development and Research Department, London, addressed members of the Midland branch of the Gemmological Association in Birmingham on April 1 on the uses and applications of metals. The branch is planning an ambitious exhibition in the autumn at the Birmingham Art Gallery which the Lord Mayor of Birmingham is to open on October 12 and for which the Duke of Devonshire is loaning the Devonshire Emerald. The Mond Nickel Company, Limited, is lending some pieces from its collection and working models will illustrate the uses and applications of precious metals while show cases will include all kinds of jewels, some of them with famous histories.

FIRMS were in danger of overstocking supplies because of the fear of renewed dock strikes and possible increases in prices, Mr. F. J. White, president of the Purchasing Officers' Association, said in Birmingham on April 2, at the first Midland Regional conference of the Association. Import figures for January and February this year confirmed this view, he said. Imports of ferrous metals, for instance, had risen about 25 per cent. on the same period for 1954. More than half the rise in total cost of the imports was due to increased volume and the rest to rise in prices. Mr. White warned members to "keep in mind the debacle of 1951 when millions of pounds were lost" as a result of a similar overstocking.

WHY was the first-ever iron bridge built at Ironbridge, Shropshire, in 1779? This query was answered by Dr. Arthur Raistrick, lecturing to the West Midland Engineering Society, at Wellington on March 28. In relating the history of the Coalbrookdale Company, he said their interest in transport resulted in the iron bridge. They had had to get materials for their works across the Severn by boat from Broseley. There was considerable trouble about tolls, and in getting the materials over. The bridge was first suggested as early as 1750. Its principal bearers were 80-ft. long and almost five tons in weight. At the time, the company was the only firm who had the skill to handle it. The Coalbrookdale company and its employees always had lively and useful minds, and were ready to welcome any new ideas and to experiment.

MORE THAN 500 British firms will be represented at the British Exhibition to be held at Copenhagen from September 29 to October 16. The exhibition is sponsored jointly by the British Import Union of Denmark and the Federation of British Industries. The total amount of space occupied by stands will be about 125,000 sq. ft., divided between the Forum and the Tivoli Gardens. The great majority of the British products displayed will be on the stands taken by Danish agents, most of whom will be representing three or more British principals; but well over 100 firms in the UK have booked space direct and will be exhibiting on their own account. Many attractions are being organized outside the exhibition itself. The most spectacular will be a British Military Tattoo to be held twice daily at Rosenborg Castle. This will be the first time that a British Tattoo has ever been staged abroad. It will be under the direction of Brigadier A. G. L. Maclean and will combine items from the Edinburgh Tattoo and the Royal Tournament.

English Electric Retirement

Colleagues of Mr. J. E. Calverley, a former chief engineer and manager of the traction department of the English Electric Company, Limited, assembled at the company's headquarters to pay him tribute on his retirement. Gifts were presented on their behalf by Sir George Nelson, chairman and managing director of the company.

Mr. Calverley joined the Phœnix Dynamo Company, Bradford, in 1908 as assistant designer and in 1910 went to Dick Kerr & Company, Preston, as assistant design engineer. He was chief engineer and manager of English Electric's traction department from 1935 to 1941, when he went to Washington. There he represented the Ministry of Supply as adviser on d.c. electrical equipment for tanks and vehicles. He returned to the company in 1943, as deputy chief engineer (technical). Since 1952 he has been engaged on special consultant duties with the company.

During his career, Mr. Calverley was mainly concerned with d.c. design and application. He was associated in the development of high-voltage d.c. machines for the BBC regional stations and his work included the development of the "Transverter," which was designed to convert alternating current, at voltages used for the generation of electrical energy into direct current at a pressure of the order of 100,000 V.

Reducing Business Commitments

To reduce his business commitments, Sir Arthur Matthews is relinquishing his directorship of Millspaugh, Limited, the Sheffield papermaking machinery manufacturers, on whose board he has served as deputy chairman. At the end of 1950, Sir Arthur gave up the managing directorship of Firth Brown Tools, Limited, and six months later resigned as managing director of Thos. Firth & John Brown, Limited, on his 65th birthday.

The business commitments in Sir Arthur's career have, indeed, been varied and onerous. They have included the chairmanship of Firth-Vickers Stainless Steels, Limited, British Acheson Electrodes, Limited, and Firth-Derihon Stampings, Limited, and directorships of John Brown & Company, Limited, the Chesterfield mining and engineering firm of Markham & Company, and the Staveley Iron & Coal Company, Limited.

At the same time, however, Sir Arthur has found time to be chairman of the heavy forgings and railway tyres, axles, solid wheels, and disc wheels centres conference for five years after its inception in 1945 and a member of the council of the Iron and Steel Institute.

Board Changes

LIGHTALLOYS, LIMITED—Mr. Clifford Waite has joined the board.

HARRISON (BIRMINGHAM), LIMITED—Mr. E. C. Burgess has resigned from the board, and Mr. Philip Green and Mr. John Martin James have been appointed directors.

EXPANDED METAL COMPANY, LIMITED—Mr. Frank Banfield, general manager, has been appointed managing director. He succeeds Lt.-Cmdr. G. C. Hans Hamilton, who retains his position as chairman of the company.

A grinder running at a constant speed under load will remove more metal in a shorter time and with less wheel wear than any machine which slows up under the efforts of the operator. That is why iron and steel founders and other works where Hicycle grinders are installed are getting more work done per operator than is possible with any other type of tool. Only Hicycle grinders have this constant speed characteristic, and there is a full range of models from small die grinders to 8in. heavy duty machines. Ask for a descriptive brochure on Hicycle grinders and other Hicycle production tools.

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THE CONSOLIDATED PNEUMATIC TOOL COMPANY LTD., 232 DAWES ROAD, LONDON, S.W.6

Personal

THE LORD CHANCELLOR, LORD KILMUIR, is to be the chief guest at the Cutlers' Feast in Sheffield on April 20.

ALLIED IRONFOUNDERS, LIMITED: Mr. JOHN A. BROWN has resigned after 60 years' service with companies in the group.

Mr. J. P. A. MELDRUM and Mr. R. H. S. TURNER have been appointed directors of Metropolitan-Vickers Electrical Company, Limited, from April 1, 1955.

Mr. J. BAXTER, head foreman of No. 15 shop of Derby Locomotive Works, has retired, and to mark the occasion he was presented with a picnic case and an electric blanket.

Mr. I. C. FORSYTH, manager of Crewe Railway Works, has returned from a two-month visit to Rhodesia. He was one of a team of four railway experts who reported upon the Rhodesian State Railways.

Capt. WILLIAM F. KEAY, chairman and managing director of Thos. C. Keay, Limited, textile engineers, and of Lawside Engineering & Foundry Company, Limited, has been elected president of the Dundee Chamber of Commerce.

Col. E. G. ANGUS, chairman of George Angus & Company, Limited, power-transmission engineers, etc., of Newcastle-upon-Tyne, has resigned from the presidency of Newcastle and Gateshead Chamber of Commerce which he has held for four years.

Sir STUART C. GOODWIN, chairman of the Neepsend Steel & Tool Corporation, Limited, Sheffield, has given £10,000 to his old school, the King Edward VI Grammar School, Retford. The gift will provide two squash courts and vacation courses for the pupils.

Mr. G. GLENTWORTH has resigned after 13 years as dock manager of Blyth Dry Docks & Shipbuilding Company, Limited, to take up another appointment at Newcastle-upon-Tyne. Mr. A. DIXON, senior assistant repair manager, has been appointed to succeed him.

AFTER 40 years' service with T. R. Dowson & Company, Limited, shiprepairers, of South Shields, Mr. T. H. H. DARLING, secretary of the company, has retired. Mr. Darling became secretary 18 years ago. His successor is Mr. C. E. SMITH, formerly chief clerk with a firm of accountants.

Mr. HEDLEY LLOYD, export director of Marsh Bros. & Company, Limited, makers of steel and engineers' tools, of Sheffield, has left on a business trip, which will involve a fortnight in Ceylon, six weeks in Australia, and four weeks in New Zealand. Mr. Lloyd will sail for home towards the end of September.

Mr. J. P. BARRETT, who was appointed to the board of Sir William Arrol & Company, Limited, bridgebuilders, structural engineers, etc., of Glasgow, in 1947, has relinquished the position of secretary, to which he was appointed in 1939, to devote his whole attention to his duties as an executive director. He is succeeded as secretary by Mr. W. S. GREY, formerly assistant secretary.

AFTER nearly 50 years' service with Cammell Laird & Company (Shipbuilders & Engineers), Limited, Birkenhead, Mr. A. DALE, manager responsible for publicity, correspondence, and marine insurance, retired on April 1. Mr. Dale started work in the Tranmere shipyard of the company in 1905, and was responsible for the social arrangements in connection with the launches of the three largest vessels built by the company, the first and second Ark Royals and the Cunard liner Mauretania.

THE PREDICTION that Britain's chemical industry would expand to twice its present size within 10 years was made in Glasgow by Dr. W. J. JENKINS, who has recently retired from the chairmanship of the Nobel division of Imperial Chemical Industries. Dr. Jenkins was speaking after he had received gifts from the directors and members of the staff to mark his retirement after 40 years' service with the company. Since 1948, he said, the industry had increased in Britain by 65 per cent. In Scotland, however, it had expanded less spectacularly—by 25 per cent., compared with a general trade expansion of 28 per cent.

THE INSTITUTION OF MECHANICAL ENGINEERS has appointed as president for the ensuing year Mr. PERCY LEWIS JONES, a director of Swan, Hunter, & Wigham Richardson, Limited. Mr. Jones is at the moment president of the North-East Coast Institution of Engineers and Shipbuilders and vice-chairman of the National Association of Marine Enginebuilders. Previously the company's technical manager, Mr. Jones was appointed manager of the Neptune Engine Works of Swan, Hunter in 1945, when he also joined the board of the associate, Wallsend Slipway & Engineering Company, Limited. He was appointed a director of Swan, Hunter in 1950, and has also served on the board of the Glasgow firm of Separators, Limited.

Obituary

Mr. JOHN W. I. DICKINSON, lately buyer for Greenwood & Batley, Limited, electrical and mechanical engineers, of Leeds, has died at the age of 71.

Mr. KENNETH HARTLEY, who has died at the age of 50, was a director of Bamforth, Garside & Company, Limited, engineers and ironfounders, of Huddersfield.

Mr. ALBERT CORKER, who retired from the board of directors of the Midland Iron Company, Limited, Rotherham, nine years ago, after serving for 62 years, has died at the age of 84.

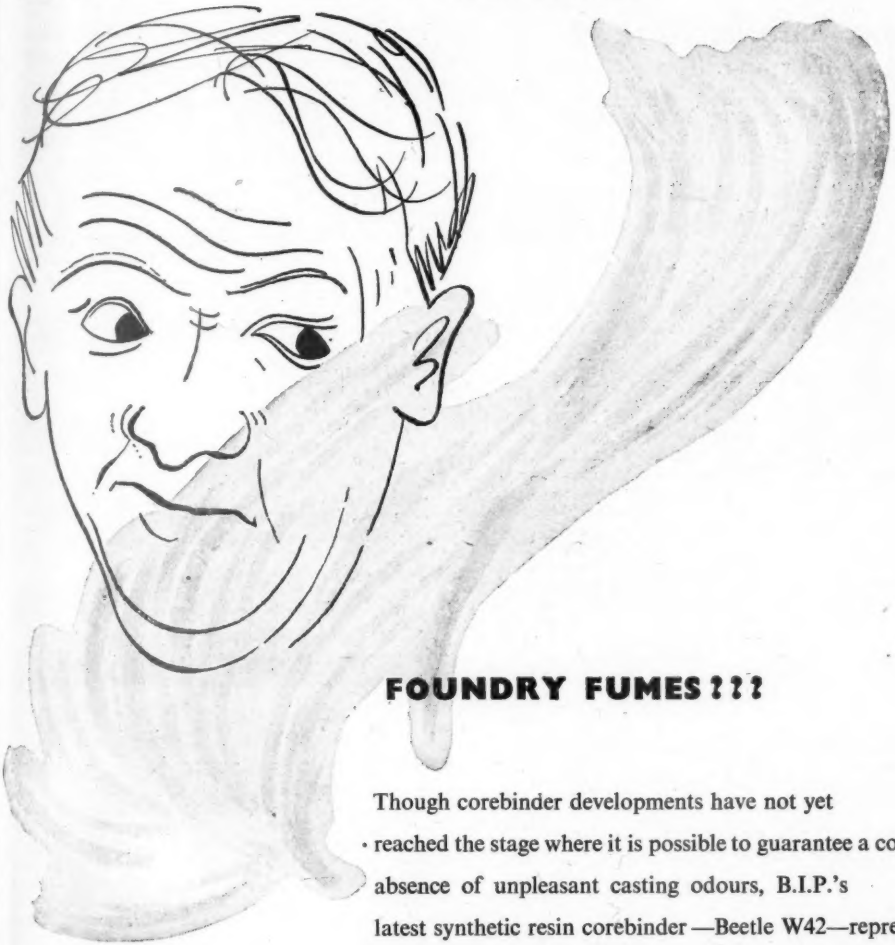
Mr. ARTHUR HILL, personal assistant to the managing director of the Staveley Iron & Chemical Company, Limited, has died at the age of 61. Mr. Hill had been with the company since he was 13.

Miss G. N. PARKER, who since 1931 had been company secretary of George Pike, Limited, engineers and tool manufacturers, of Birmingham, has died after a short illness. She was the first employee of the company, which she joined in 1920 at the age of 16.

Mr. W. H. G. SUMMERSCALES, who has died at the age of 61, was chairman of W. & S. Summerscales, Limited, engineers, of Keighley (Yorks). He was also a director of Keighley Laboratories, Limited, and had been president of the Keighley Employers' Federation.

The death is announced of Mr. RICHARD WILLIAM TYRONE DOBSON, who for several years had been works manager of Amal, Limited, manufacturers of car and aircraft components, etc., of Birmingham. He had been with the firm for 30 years. Mr. Dobson, who was 60, died from injuries he received on Sunday when the horse he was riding got out of control and threw him.

Mr. DAVID NEWSTEAD died suddenly at his home in Moseley, Birmingham, on April 2; he was aged 73 years. The founder of Modern Furnaces & Stoves, Limited, which was registered as a private limited company in 1940, he remained its managing director until his death. He was the sole patentee and designer of the wide variety of products in which the company specializes and was personally well known in the foundry industry. He joined the Birmingham branch of the Institute of British Foundrymen in 1940.



FOUNDRY FUMES???

Though corebinder developments have not yet reached the stage where it is possible to guarantee a complete absence of unpleasant casting odours, B.I.P.'s latest synthetic resin corebinder—Beetle W42—represents a very considerable advance in this direction. Developed with the Garrett Report in mind, it combines all the advantages of Beetle W20 with a reduction in casting odour that will be appreciated by foundrymen.

use* BEETLE RESIN W42* *for reduced casting odour

B·I·P

Write for technical information to B.I.P. Chemicals Limited,
Tat Bank House, Oldbury, Nr. Birmingham. London Office : 1 Argyll Street, W.1.

'Beetle' is a trade mark registered in Great Britain and in most countries of the World.

**Patent Application 32896/58*

Raw Material Markets

Iron and Steel

Pig-iron supplies are extremely tight, and no early improvement is foreshadowed. More foreign iron is coming to hand, but most of it is going to the steelworks, and the difficulties of the foundry trade are as acute as ever.

The light foundries, although admittedly working with slender stocks, are able to make do with current deliveries of high-phosphorus iron, but the position of the makers of special castings for the engineering, electrical, and motor industries has become precarious. Supplies of low- and medium-phosphorus iron, already short, threaten to become shorter still, as a blast furnace producing this grade is due for relining, but there may be some compensation in the relighting of an additional furnace on hematite.

An expansion of the deliveries of semi-finished steel to the re-rolling mills is urgently needed. Orders for steel bars and light sections are now abundant, and since they include a substantial volume of export business, it is imperative that production should not be held up. This, however, is an immediate prospect unless more liberal supplies of billets are quickly forthcoming. Arrangements are in hand to increase imports of foreign semis and they cannot arrive too soon. Wire drawers are in need of more liberal supplies of rods, and there is a swollen demand for bars and slabs for the sheet-mills.

Notwithstanding the unparalleled rate of production of finished steel, the gap between supply and demand has not been narrowed. New orders accrue, or are at least on offer, as rapidly as tonnages already booked are cleared from the works. The phenomenal activity of the engineering and motor industries, coupled with a swelling volume of capital investment, is imposing heavy demands on the steel industry in general and the sheet, section, and light rolling mills in particular. Makers are offered far more business than they can handle and are limiting their forward commitments to tonnages which they can reasonably expect to provide.

Non-ferrous Metals

The increase in the United States zinc price from 11½ to 12 cents last week came as something of a surprise, for there seemed to be no real justification for it. The statistical position in the States has been improving, however, and stocks have come down to a fairly low level recently, but so far as the rest of the world is concerned, there is certainly plenty of zinc, at any rate of the g.o.b. quality, although high-grade may be somewhat scarce.

The London market moved up fairly sharply on the news of the advance, but the price came back again and closed at £89 10s. sellers of first half April and £88 10s. July. On balance, both positions gained 15s. In some quarters it is felt that it will be hard to hold 12 cents over this year and that later we shall see a reduction to 11½ cents again, or even lower. Trading in zinc on the London market was active and the turnover larger than usual.

Lead showed little change apart from a drop of 5s. in the prompt price. Tin was steady, showing an advance of £3 10s. for cash and £4 10s. for three months.

Copper suffered something of a landslide, for the cash price fell by no less than £23 between the close of business on Thursday's midday session and the previous Friday, while three months was down £20 10s. This week the collapse continued and at the end of the morning session on Wednesday cash was little above £300. The start of the collapse was probably the report that the threat of a strike in Chile had been removed, at any rate for the present. There is evidently going to be some copper from US Government sources put at the disposal of consumers. This is estimated at about 17,000 short tons over three months.

Support for the market was not forthcoming in the shape of business with consumers; buying was half-hearted, due, perhaps, to the holiday weekend. In spite of the setback in London, which was more severe than most people expected, it would not seem that the fall can go very far at present, for there are plenty of users who require copper.

Official metal prices were as follow:—

COPPER, Standard—*Cash:* April 6, £351 to £352; April 7, £340 to £341; April 12, £339 to £339 10s.; April 13, £303 to £304.

Three Months: April 6, £344 to £345; April 7, £332 to £333; April 12, £331 10s. to £332; April 13, £299 to £300.

TIN, Standard—*Cash:* April 6, £717 to £717 10s.; April 7, £717 to £717 10s.; April 12, £716 to £717; April 13, £714 10s. to £715 10s.

Three Months: April 6, £718 to £718 10s.; April 7, £718 to £719; April 12, £716 10s. to £717; April 13, £715 10s. to £716.

LEAD—*First half April:* April 6, £104 15s. to £105; April 7, £104 5s. to £104 10s.; April 12, £104 10s. to £104 15s.; April 13, £104 10s. to £104 15s.

First half July: April 6, £103 15s. to £104 5s.; April 7, £103 15s. to £104; April 12, £103 15s. to £104; April 13, £104 7s. 6d. to £104 10s.

ZINC—*First half April:* April 6, £89 10s. to £89 15s.; April 7, £89 to £89 10s.; April 12, £89 5s. to £89 10s.; April 13, £89 10s. to £89 15s.

First half July: April 6, £88 10s. to £89; April 7, £88 5s. to £88 10s.; April 12, £88 to £88 5s.; April 13, £88 to £88 5s.

Oversea Trade Enquiries

Details of Trade inquiries made by companies oversea concerning British manufactures are given below. Unless informed otherwise, interested manufacturers are advised to communicate (by air mail if stated) with the inquirer at the address given. At the same time they are requested to notify the local oversea representative of the UK Government, whose address is also given below, of any action taken. Any correspondence with the Export Services Branch of the Board of Trade, at Lacon House, Theobalds Road, London, W.C.1 (telephone: CHAncery 4411, extension 776), should bear the appropriate BOT reference, which is quoted in parentheses at the end of each inquiry.

THE WON DONG HUNG-UP COMPANY, 65, Nam-nai Dong, Sunchon, Cholla Namdo, Korea, wishes to purchase a wide range of manufacturing machinery and equipment, which includes induction motors, electrical equipment, pumps, travelling crane, compressors, etc. (ESB/6295/55.)

MR. MOHAMED S. FATEH, of the Jahan Trading Company, 260, Avenue Bouzarjomehri, Tehran, Persia, wishes to obtain offers from UK manufacturers for air conditioning equipment. Notify the Economic and Commercial Department, British Embassy, Avenue Firdausi, Tehran. (ESB/28649/54.)

PAKISTAN CYCLE INDUSTRIAL CO-OPERATIVE SOCIETY, LIMITED, Nila Gumbad, Lahore, Pakistan, wishes to receive quotations from UK manufacturers of machinery for manufacturing cycles. Notify the UK Trade Commissioner, National House, Bank Square, The Mall, Lahore (PO Box 287). (ESB/6825/55.)

TURNER HOARE & COMPANY, LIMITED, Gateway Building, Apollo Street, Fort, Bombay, 1, India, wishes to receive quotations for steel railway rails from UK manufacturers. Notify the UK Trade Commissioner, PO Box 815, Mercantile Bank Building, Mahatma Gandhi Road, Bombay, 1. (ESB/6994/55.)

JOSEPH PICKARD'S SONS COMPANY, Keystone & Benner Streets, Philadelphia, 24, Pennsylvania, USA, wishes to obtain sources of supply in the UK for high alloy tool steel rolled to varying specifications. Letters by air mail. Notify the British Consulate-General, 12, South 12th Street, Philadelphia, 7, Pennsylvania. (ESB/6403/55.)

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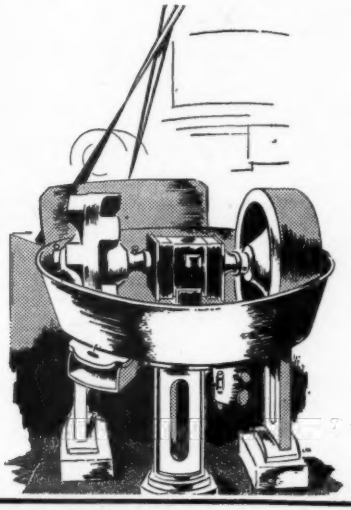

For service and information write to:—

THE FULLERS' EARTH UNION LTD.

Patteson Court, Redhill, Surrey. Tel: Redhill 3521. CHT. 16

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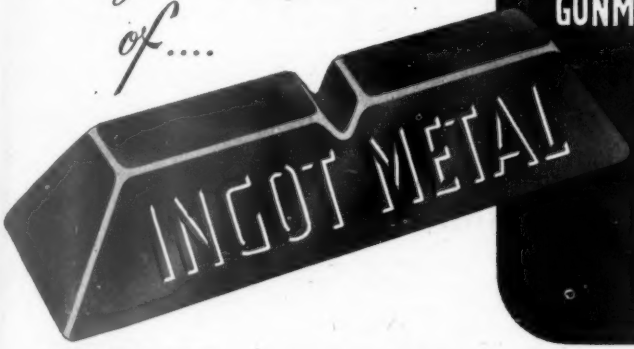

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Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

April 13, 1955

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £15 12s. 0d.; Birmingham, £15 5s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £17 13s. 9d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £18 9s. 3d.

Scotch Iron.—No. 3 foundry, £18 2s. 3d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £20 4s. 0d.; South Zone, £20 6s. 6d.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £21 1s. 6d.; South Zone, £21 4s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. of England (local iron), £18 2s. 6d.; Scotland (Scotch iron), £18 9s. 0d.; Sheffield, £19 7s. 6d.; Birmingham, £19 14s. 6d.; Wales (Welsh iron), £18 9s. 0d.

Basic Pig-iron.—£15 15s. 6d. all districts.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots).—40/55 per cent., £40 15s. 0d., basis 45 per cent. Si, scale 15s. per unit; 70/84 per cent., £63 0s. 0d., basis 75 per cent. Si, scale 16s. per unit.

Ferro-vanadium.—50/60 per cent., 23s. 8d. to 25s. 0d. per lb. of V.

Ferro-molybdenum.—65/75 per cent., carbon-free, 11s. 0d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £161 0s. 0d. to £165 0s. 0d. per ton; 38/40 per cent., £258 0s. 0d. to £262 0s. 0d. per ton.

Ferro-tungsten.—80/85 per cent., 14s. 9d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 17s. 9d. per lb. of W.

Ferro-chrome (6-10 ton lots).—4/6 per cent. C, £80 0s. 0d. to £82 0s. 0d., basis 60 per cent. Cr, scale 25s. 0d. per unit; over 6 per cent. C, £78 0s. 0d. to £80 0s. 0d., basis 60 per cent. Cr, scale 24s. 0d. per unit; 2 per cent. C,* 1s. 10d. per lb. Cr; 1 per cent. C,* 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 11d. to 2s. 1d. per lb. Cr; 0.10 per cent. C,* 1s. 11d. to 2s. 2d. per lb. Cr; 0.06 per cent. C,* 2s. 3d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 7½d. to 7s. 1d. per lb.

Metallic Manganese.—93/95 per cent., carbon-free, £225 0s. 0d. to £232 0s. 0d. per ton; 96/98 per cent., £259 0s. 0d. to £265 0s. 0d. per ton.

Ferro-columbium.—60/75 per cent., Nb + Ta, 52s. 6d. to 70s. 0d. per lb., Nb + Ta.

Ferro-manganese (home).—78 per cent., £53 17s. 6d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., £25 5s. 0d.; tested, 0.08 to 0.25 per cent. C, £26 5s. 0d.; hard (0.41 to 0.60 per cent. C), £27 10s. 0d.; silico-manganese, £34 10s. 0d.; free-cutting, £29 6s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £32 17s. 0d.; silico-manganese, £34 10s. 0d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £29 13s. 6d.; basic, hard, over 0.41 up to 0.60 per cent., C, £30 16s. 0d.; acid, up to 0.25 per cent. C, £33 15s. 0d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £31 1s. 6d.; boiler plates (N.-E. Coast), £33 11s. 6d.; floor plates (N.-E. Coast), £32 10s. 6d.; sectional material, N.-E. Coast, £29 4s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested, £31 19s. 6d.; flats, 5 in. wide and under, £31 19s. 6d.; hoop and strip, £33 1s. 6d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., £34 5s. 0d.; black sheets (hand mill), 17/20 g., £43 13s. 6d.; galvanized corrugated sheets, 24 g., £55 4s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £54 7s. 9d.; nickel-chrome, £76 7s. 9d.; nickel-chrome-molybdenum, £86 8s. 6d.

NON-FERROUS METALS

Copper.—Cash, £303 0s. 0d. to £304 0s. 0d.; three months, £299 0s. 0d. to £300 0s. 0d.; settlement, £304 0s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 3s. 5½d. per lb.; rods, 403s. 0d. per cwt. basis; 20 s.w.g., 434s. 3d. per cwt.

Tin.—Cash, £714 10s. 0d. to £715 10s. 0d.; three months, £715 10s. 0d. to £716 0s. 0d.; settlement, £715 10s. 0d.

Lead (Refined Pig).—First half April, £104 10s. 0d. to £104 15s. 0d.; first half July, £104 7s. 6d. to £104 10s. 0d.

Zinc.—First half April, £89 0s. 0d. to £89 15s. 0d.; first half July, £88 0s. 0d. to £88 5s. 0d.

Zinc Sheets, etc.—Sheets, 15 g. and thicker, all English destinations, £120 5s. 0d.; rolled zinc (boiler plates), all English destinations, £118 0s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £103 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 2s. 8½d. per lb.; rods, drawn, 3s. 6d.; sheets to 10 w.g., 350s. 0d. per cwt.; wire, 3s. 3½d.; rolled metal, 335s. 9d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £226; B6 (85/15), £301; BS249, £236.

Brass (High Tensile).—BS1400, HTB1 (30 tons), £264; HTB2 (38 tons), £276; HTB3 (48 tons), £285.

Gunmetal.—RCH, 3/4 per cent. tin, —; BS1400, LG2 (85/5/5/5), £303; LG3 (86/7/5/2), £310; G1 (88/10/2/½), £386; (88/10/2/1), £379.

Phosphor Bronze.—BS1400, PB1* (AID released), £401 per ton.

Phosphor Bronze Strip, etc.—Strip, 486s. 0d. per cwt.; sheets to 10 w.g., 509s. 6d. per cwt.; wire, 4s. 11½d. per lb.; rods, 4s. 4d.; tubes, 4s. 2½d.; chill cast bars: solids 4s. 3½d., cored 4s. 4½d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 4s. 1½d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 6½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 5½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 3d. per lb. Antimony, English, 99 per cent., £210 0s. 0d. Quicksilver, ex-warehouse, £108 10s. 0d. to £109 0s. 0d. Nickel, £519 0s. 0d. Aluminium, ingots, £163 0s. 0d.; aluminium bronze (BS1400), AB1, £345; AB2, £354. Solder, brazing, BS1845, 2s. 9d. lb.; granulated, 3s. 0d. lb.

* Average 68-70 per cent.